

HAWAIIAN SUGAR MANUAL



1978

Hawaiian Sugar
Planters' Association

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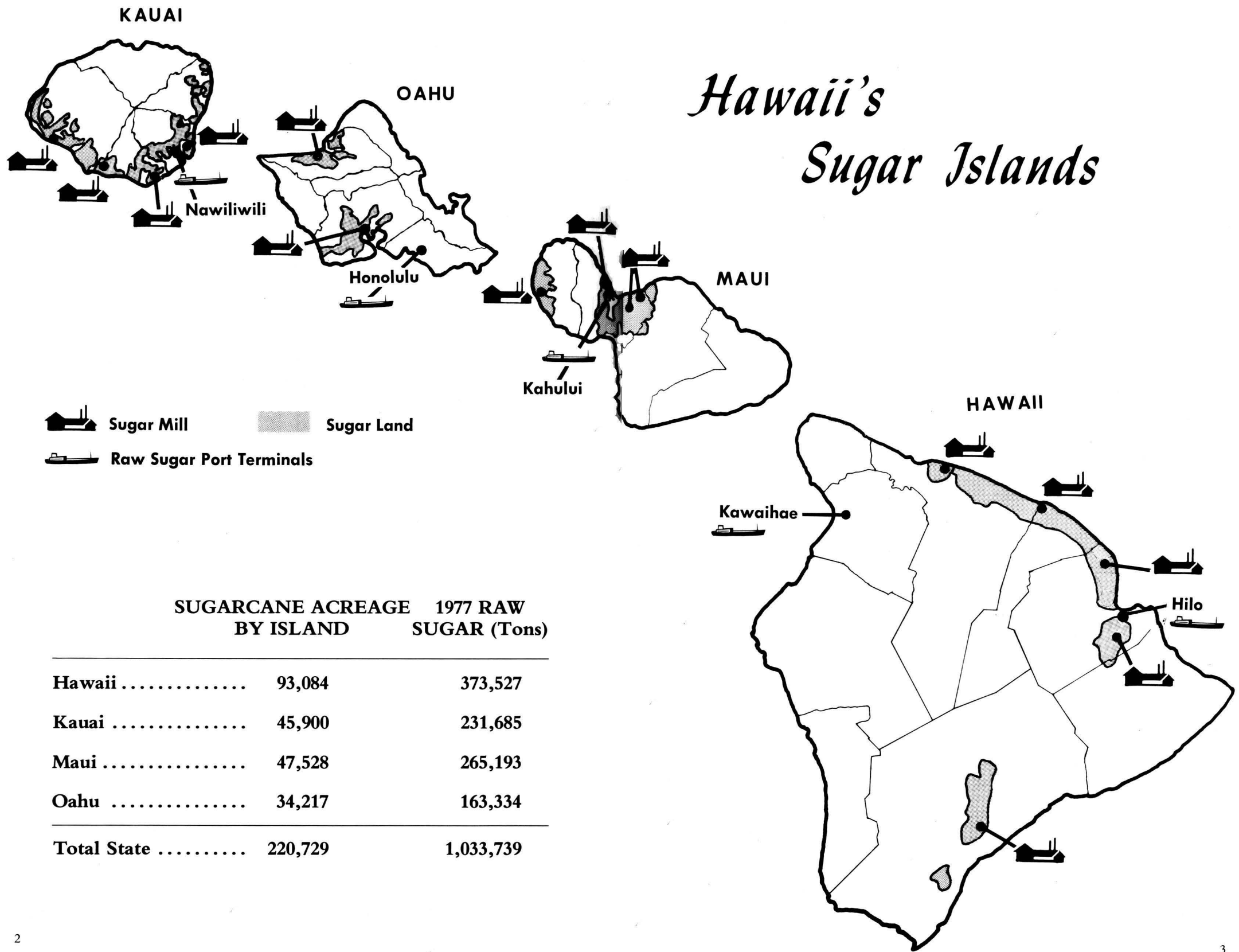
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HAWAIIAN SUGAR COMPANIES

ISLAND OF KAUAI

GAY & ROBINSON
Makaweli, Kauai 96769
Phone: 338-8233

KEKAHA SUGAR COMPANY, LTD.
T. J. O'Brien, *Pres. & Mgr.*
Kekaha, Kauai 96752
Phone: 337-1472

THE LIHUE PLANTATION COMPANY, LTD.
L. A. Faye, Jr., *Pres. & Mgr.*
Lihue, Kauai 96766
Phone: 245-2112

MCBRYDE SUGAR COMPANY, LTD.
P. F. Conrad, *V.P., Mgr.*
Eleele, Kauai 96705
Phone: 335-5333

OLOKELE SUGAR COMPANY, LTD.
R. F. Cameron, *V.P., Mgr.* (R. B. Cushnie)*
Kaumakani, Kauai 96747
Phone: 335-5337

ISLAND OF OAHU

OAHU SUGAR COMPANY, LTD.
D. W. Ballie, Jr., *Pres., Mgr.* (W. G. Hall)*
Waipahu, Oahu 96797
Phone: 677-3577

WAIALUA SUGAR COMPANY, INC.
W. W. Paty, Jr., *Pres., Gen. Mgr.*
Waialua, Oahu 96791
Phone: 637-4520

ISLAND OF MAUI

HAWAIIAN COMMERCIAL & SUGAR COMPANY
W. S. Haines, *Mgr.*
Puunene, Maui 96784
Phone: 877-0081

PIONEER MILL COMPANY, LTD.
W. G. Hall, *Pres., Mgr.* (W. D. Balfour, Jr.)*
Lahaina, Maui 96761
Phone: 661-0592

WAILUKU SUGAR COMPANY
I. W. Bowman, *V.P., Mgr.*
Wailuku, Maui 96793
Phone: 244-7079

ISLAND OF HAWAII

HILO COAST PROCESSING COMPANY¹
D. J. Martin, *Pres., Gen. Mgr.* (T. H. Inglett)*
Pepeekeo, Hawaii 96783
Phone: 963-5516; 963-6669

HONOKAA SUGAR COMPANY
P. E. Bouvet, *V.P., Gen. Mgr.*
Paauhau, Hawaii 96775
Phone: 775-7261

KA'U SUGAR COMPANY, INC.
T. H. Inglett, *V.P., Mgr.* (R. F. Cameron)*
Pahala, Hawaii 96777
Phone: 928-8311

LAUPAHOEHOE SUGAR COMPANY
F. C. Schattauer, *V.P., Mgr.*
Papaaloa, Hawaii 96780
Phone: 962-6314; 962-6244

MAUNA KEA SUGAR COMPANY, INC.²
S. W. Knox, *V.P., Mgr.*
Papaikou, Hawaii 96781
Phone: 964-1025

PUNA SUGAR COMPANY, LTD.
J. T. Humme, *Pres., Mgr.*
Keaau, Hawaii 96749
Phone: 966-9242

¹Sugarcane milling company cooperatively owned by United Cane Planters Cooperative and Mauna Kea Sugar Co.

²Mauna Kea Sugar Company is a grower which delivers its cane to Hilo Coast Processing Co.

*Effective July 1, 1978

Part I

HAWAII'S SUGAR INDUSTRY

Within the past few years, the visitor industry has become a major economic base for Hawaii. From a very small business following World War II, tourism grew rapidly following Hawaii's statehood and the introduction of the jet aircraft. Military expenditures continue to be the second most important source of outside income for the state; while agriculture, although still important, is not the predominant factor it once was.

In 1977 the Hawaiian economy received \$1.5 billion in direct tourist expenditures and over \$1 billion in federal expenditures.

Agricultural products rank third as a source of income for the State. In recent years they have brought in approximately \$575 million per year. Of this total, sales of raw sugar and molasses account for about 50%; income from pineapple, both canned and fresh fruit, about 25%; and diversified agriculture (livestock, poultry, milk, fresh vegetables and fruits, macadamia nuts and flowers), approximately 25%.

The State of Hawaii imports most of its essentials—food, building materials, fuel, and clothing—so income from “export” products is necessary in the State's balance of trade.

SUGARCANE IN HAWAII

1978 is the bicentennial of the discovery of the Hawaiian Islands by Capt. James Cook. Capt. Cook noted in his journal that he observed sugarcane growing in the Islands on his discovery visits. This important food plant had been brought to Hawaii by the Polynesians who had arrived some 800 years before Cook. The Hawaiians did not produce crystallized sugar from their sugarcane; they, as did other Pacific Island peoples, chewed it.

Don Francisco de Paula Marin was the first European horticulturist who recorded his experiences with native and introduced plants in Hawaii. In March 1819 he noted that he had extracted juice from the sugarcane. There were other abortive efforts to produce sugar from sugarcane but the first successful operation was a plantation started at Koloa on the Island of Kauai in 1835. Some of the fields at Koloa have grown sugarcane continuously since then and are still producing satisfactorily today. Koloa first milled sugarcane in 1837 and 5,039 pounds of sugar and 400 pounds of molasses were sent out by ship in that year.

Sugarcane growing expanded throughout the Kingdom of Hawaii, slowly at first, but rapidly after the negotiation of the Reciprocity Treaty with the United States in 1876. It expanded even more rapidly after Hawaii became a territory of the U.S. Production had reached 100,000 tons in 1886, had expanded to 250,000 tons by 1897, and had doubled again to 500,000 tons in 1908.

In 1977, a total of 1,033,739 tons of raw sugar and 284,349 tons of molasses were produced in Hawaii.

GROWING SUGAR IN HAWAII

Hawaii's sugarcane industry differs from that in other sugarcane growing areas of the world in two important respects. First, the harvest season is virtually year-round. Each raw sugar mill suspends operations at a selected period for maintenance and overhauling, usually one to two months in each year. Harvesting and planting, therefore, are carried on throughout the year. Second, the age of the sugarcane crop at harvest averages two years. A few fields are harvested at 18 months, while some may be as old as four years.

These characteristics of the sugarcane crop result from the fact that Hawaii has a temperate rather than a truly tropical climate, with more rain falling in the cool part of the year than in the warm part. Rainfall in Hawaii varies tremendously from place to place over very short distances. Average annual rainfall on some sugarcane land exceeds 200 inches, while on others it is as low as 15 inches. Accordingly, fifty-five percent of Hawaii's sugarcane lands are irrigated. The irrigated fields produce about 63% of Hawaii's annual production. Demands for available water, especially on the Island of Oahu, have become so great that scientists and engineers have sought more efficient ways of irrigating the sugarcane crop. Drip irrigation has developed rapidly and is now being used on some 30,000 acres, or about 25% of the irrigated area. It provides more efficient use of water, more uniform application and can be automated.

The irrigation systems, including not only the in-field application, but the tunnels, dikes, ditches, wells and pumps have all been designed and built by the sugar companies without any government assistance or contributions.

Hawaii's sugar industry is one of the most highly mechanized in the world. Heavy capital investment in field machinery and in factory processing equipment and controls have made Hawaii's sugarcane workers the most productive in the world.

PLANTING AND HARVESTING

Sugarcane is propagated vegetatively. Pieces of cane stalks, commonly called “seed” in Hawaii and called “cuttings” in many other parts of the world, are cut from growing sugarcane and are planted to start a new crop.

Sugarcane is planted by machines which drop the sugarcane pieces in rows and then cover the pieces with soil.

About half of Hawaii's sugar lands are harvested each year. When sugarcane is harvested, it grows again from the old stubble left in the ground. From two to four ratoon crops are obtained from each original planting. Then the field is plowed again and replanted with new seed pieces.

The fields are burned before harvest to dispose of accumulated dead leaves and other trash. Small, discrete areas are burned immediately before harvest. The fire is intense and brief and although there are large visible clouds of steam and some particulate matter, there are no harmful pollutants in the

smoke from cane fires. Field burning is done under permits from the Hawaii State Department of Health under regulations of the Federal Environmental Protection Agency. Burning is economically essential, for the cost of transporting trash to the mill and removing it there have been shown to be very high.

After the fields are burned, mechanical harvesters are used. These push the cane into windrows where giant grab cranes load the cane into tractor-trailers which haul the cane to the mill for processing into raw sugar.

Some plantations use a V-cutter, which has a v-shaped blade with a vertical cutting wheel at the front. The cane cut by this machine is also loaded with grab cranes after it is picked up and taken to the edge of the field.

Newer developments include mechanical harvesters now being used by some non-irrigated planta-

tions. These harvesters cut the cane, chop it into short lengths and use forced air to blow much of the trash and soil from the cane. Engineers are seeking new ways in which cane can be harvested and cleaned more efficiently.

RAW SUGAR TO THE U.S. MAINLAND

Almost all Hawaiian raw sugar is shipped to the U.S. mainland for refining and marketing. In 1977 this amounted to 95% of the total production. About 5% was refined at the C and H Sugar Company refinery in Aiea, Hawaii, primarily for Hawaiian consumption.

All Hawaiian raw sugar is transported in bulk form. The bulk sugar is loaded on ships from terminals at Kahului, Maui; Hilo and Kawaihae, Hawaii; Honolulu, Oahu; and Nawiliwili on Kauai.

In 1977 there were 54 voyages of ships carrying raw sugar from Hawaii to the U.S. mainland.

**HAWAIIAN SUGAR COMPANIES BY ISLANDS, WITH ACREAGE
AND PRODUCTION FOR 1977
(Raw Value)**

	Total Caneland Acreage	Acreage Harvested	Production (short tons)
HAWAII			
Hilo Coast Processing Co. (Processor only)			112,628 ¹
Mauna Kea Sugar Co. (Grower only)	17,231	8,106	.....¹
United Cane Planters Coop. (Grower only)	7,689	3,436	.....¹
(378 member-growers)			
Honokaa Sugar Co.	16,716	6,556	73,244
Ka'u Sugar Co., Inc.	16,689	4,604	55,921
Laupahoehoe Sugar Co.	18,900	7,021	76,105
Puna Sugar Co., Ltd.	15,859	6,297	55,629
TOTAL HAWAII	93,084	36,020	373,527
KAUAI			
Gay and Robinson (Grower only)	2,675	1,298	17,853 ²
Kekaha Sugar Co., Ltd.	7,879	3,864	47,093
The Lihue Plantation Co.	17,409	8,282	78,364
McBryde Sugar Co., Ltd.	13,111	6,373	56,712
Olokele Sugar Co., Ltd.	4,826	2,370	31,663
TOTAL KAUAI	45,900	22,187	231,685
MAUI			
Hawaiian Commercial & Sugar Co.	32,886	15,818	187,678
Pioneer Mill Co., Ltd.	9,180	4,516	49,772
Wailuku Sugar Co.	5,462	2,552	27,743
TOTAL MAUI	47,528	22,886	265,193
OAHU			
Oahu Sugar Co., Ltd.	18,866	9,015	92,406
Waialua Sugar Co., Inc.	15,351	6,663	70,928
TOTAL OAHU	34,217	15,678	163,334
TOTAL—ALL ISLANDS	220,729	96,771	1,033,739

¹80,971 tons attributed to Mauna Kea Sugar Co. 31,657 tons attributed to United Cane Planters Coop.

²Gay & Robinson sugarcane milled by Olokele Sugar Co., Inc.

**AVERAGE RAW SUGAR PRICE, AVERAGE DAILY EARNINGS
FOR NON-SUPERVISORY EMPLOYEES,
AVERAGE NUMBER OF ADULT
HOURLY RATED EMPLOYEES, AND TOTAL MAN-DAYS
ALL HOURLY RATED EMPLOYEES
ON HAWAIIAN SUGAR PLANTATIONS**

	Average New York Raw Sugar Price, cents per pound (Hawaiian Basis) ¹	Average Daily Earnings ²	Adult Hourly-Rated Employees ³	Total Man-Days Hourly-Rated Employees
1940	2.78	\$ 2.18	35,062	9,994,863
1941	3.39	2.48	30,646	8,870,704
1942	3.74	2.90	26,371	7,923,641
1943	3.74	3.59	23,847	7,562,690
1944	3.74	3.91	22,543	7,062,227
1945	3.75	5.10	20,806	6,350,489
1946	4.59	5.28	22,131 ⁴	5,247,294 ⁴
1947	6.22	7.63	22,743	6,443,424
1948	5.56	8.02	21,381	5,820,806
1949	5.81	8.04	20,258	5,437,839
1950	5.93	8.30	19,340	5,069,682
1951	6.06	9.00	18,654	4,894,004
1952	6.26	9.70	18,193	4,653,898
1953	6.29	10.20	17,589	4,386,554
1954	6.09	10.58	16,773	4,163,264
1955	5.95	10.62	15,935	3,896,761
1956	6.09	10.73	15,065	3,646,860
1957	6.25	11.20	14,085	3,457,428
1958	6.27	12.78	13,304 ⁵	2,333,527 ⁵
1959	6.24	12.84	12,755	3,082,207
1960	6.31	13.18	12,111	2,917,459
1961	6.30	14.11	11,660	2,787,714
1962	6.45	14.96	10,960	2,675,974
1963	8.20	16.68	10,722	2,582,706
1964	6.90	17.60	10,516	2,593,094
1965	6.75	18.40	10,346	2,505,839
1966	6.99	19.76	10,040	2,447,554
1967	7.28	21.35	9,756	2,346,197
1968	7.52	21.62	9,481	2,282,654
1969	7.75	23.26	9,213 ⁶	2,066,244 ⁶
1970	8.08	24.24	8,908	2,139,183
1971	8.52	26.08	8,610	2,077,011
1972	9.10	29.09	8,127	1,934,563
1973	10.30	30.86	7,900	1,897,369
1974	29.43	34.41	7,700 ⁷	1,744,346 ⁷
1975	22.49	37.34	7,800	1,937,973
1976	13.31	43.12	7,500	1,854,272
1977	11.11 ⁹	43.92	7,200	1,660,298 ⁸

¹Hawaiian basis is the average New York raw sugar price computed over all the days in the year. The New York price is computed for days the New York market is operating. Local sugar land leases are based on the Hawaiian basis rather than the New York basis.

²Cash wage only. Does not include "employee benefits."

³Prior to 1947 included only male adults.

⁴1946: industry-wide strike, 2½ months.

⁵1958: industry-wide strike, 4 months.

⁶1969: industry-wide strike, 5 weeks.

⁷1974: industry-wide strike, 6 weeks.

⁸1977: industry-wide strike, 3 weeks.

⁹New York spot price discontinued Nov. 2, 1977; after that date based on Clearing Association settlement prices.

WAGES, HOURS & WORKING
CONDITIONS

Hawaii's sugar workers, both field and factory, are members of the International Longshoremen's and Warehousemen's Union (ILWU). A new contract was negotiated with the ILWU, running from November 19, 1977 through January 31, 1979. Under this contract, the minimum pay (Grade 1) is currently \$4.49 per hour, increasing to \$4.59 per hour July 1, 1978. The rate of pay for Grade 11 is \$6.625 per hour, increasing to \$6.725 on July 1, 1978.

Unlike some farming areas where crops are seasonal, Hawaii's sugar industry provides year-round, long-term employment.

In 1977 the payroll for all Hawaii's sugar workers amounted to \$102,000,000.

DAILY AVERAGE EARNINGS IN 1977

Wages	\$43.92
Employee Benefits	19.97
Total	\$63.89

EMPLOYEE BENEFITS

Year-round employees receive up to four weeks vacation with pay, nine paid holidays a year; paid sick leave for up to 54 days plus a temporary disability supplement for extended illness, medical plan, a dental care plan for dependent children, retirement pensions, severance pay and many other benefits.

APPROXIMATE EMPLOYMENT
BY OCCUPATION AT SUGAR COMPANIES

Factory	1,100
Field	2,800
Motive Equipment	1,500
Construction & Surveying	160
Clerical	210
Trades	1,400
Miscellaneous	350
Supervisors	1,030
Total	8,550

SUGAR LANDS

The Hawaiian Islands make up the union's fourth smallest state. The islands are actually the summits of a chain of volcanic mountains, some of which are still active. Only certain lowlands near the coasts are tillable because of the rugged terrain and the character of the soils. The balance is forest, pasture and wasteland.

Hawaii's sugar companies are located along the coastlines of the four sugar islands and push upwards into the foothills and mountains.

Approximately 220,000 acres are devoted to growing sugar in Hawaii, with about 37,000 acres in mill sites, roads, irrigation systems, etc., or uncultivated land. This is equal to about 5 percent of total land area and about 9 percent of total private land.

More than half of the sugar lands are owned by the sugar companies. The balance is leased from government or private owners.

ISLAND LAND AREAS WITH SUGAR

Island	Ex- treme Length Miles	Ex- treme Width Miles	Area		1977 Total Cane Acreage ²
			Square Miles ¹	Acres 000's	
Hawaii	93	76	4,038	2,584	93,084
Maui	48	26	729	466	47,528
Oahu	44	30	608	388	34,217
Kauai	33	25	553	354	45,900
Molokai	38	10	261	167	.....
Lanai	18	13	139	89	.....
Niihau	18	6	73	46	.....
Kahoolawe ..	11	6	45	28	.....
Minor Islands .....	.....	.....	4	2	.....
			6,450	4,128	220,729

¹Includes land and inland water.
²Does not include mill sites, roads, etc.

HAWAII LAND OWNERSHIP

Private	58.0%
Hawaii State	34.6%
Federal Government	7.4%
	<hr/>
	100.0%

Source: State of Hawaii Data Book, 1977.

LAND USED BY SUGAR COMPANIES*

Sugar Companies & Independent Grower Farms		
Land Used		Total
By Sugar Companies	Acreage	Acreage
Owner in fee simple	137,667	
Leased from private owners or estates	76,433	
Leased from State of Hawaii ..	31,247	
		245,347
Land Used By		
Independent Grower Farms		
Leased from sugar companies .	3,185	
Sub-leased from sugar companies	2,415	
Direct Ownership, or Leased from Other Sources	6,842	
Total		12,442
		257,789

*Includes attributable land (roads, reservoirs, mill sites and irrigation ditch systems) in addition to that used for cultivation.

CANE SUGAR: PRODUCTION IN HAWAII

Calendar year ¹	Tons sugar per acre	Tons cane per ton sugar	Total cane land area	CANE USED FOR SUGAR			SUGAR PRODUCED		Raw value 96° sugar made per short tons of cane	Molasses Production
				Acreage harvested ²	Average yield per acre	Production	Converted to 96° raw value ³	Equivalent refined ⁴		
			Acres	Acres	Short Tons	Short Tons	Short Tons	Short Tons	Pounds	
1908-1909	5.14	7.42	201,641	106,127	38.2	4,050,000	545,738	510,048	270	
1909-1910	4.81	7.78	209,469	110,247	37.4	4,122,000	529,940	495,282	257	
1910-1911	5.16	7.94	214,312	112,796	41.0	4,623,000	582,196	544,120	252	
1911-1912	5.34	7.75	216,345	113,866	41.4	4,711,000	607,863	568,109	258	
1912-1913	4.90	7.99	215,741	113,548	39.1	4,445,000	556,654	520,249	250	
1913-1914	5.54	8.01	217,470	112,700	44.4	5,000,000	624,165	583,345	250	
1914-1915	5.75	7.96	239,800	113,164	45.8	5,184,393	650,970	608,397	251	
1915-1916	5.17	8.14	246,332	115,419	42.1	4,859,424	596,703	557,679	246	
1916-1917	5.57	7.98	247,476	117,468	44.4	5,220,000	654,388	611,591	251	
1917-1918	4.86	8.34	246,813	119,785	40.5	4,855,804	582,192	544,117	240	
1918-1919	5.07	7.81	239,844	119,679	39.6	4,744,070	607,174	567,465	256	
1919-1920	4.91	7.98	247,838	114,105	39.2	4,473,498	560,379	523,730	251	
1920-1921	4.83	8.53	236,510	113,056	41.2	4,657,222	546,273	510,547	235	
1921-1922	4.98	8.23	228,519	124,124	41.0	5,088,062	618,457	578,010	243	
1922-1923	4.85	8.23	235,134	114,182	39.9	4,559,819	554,199	517,954	243	
1923-1924	6.42	7.91	231,862	111,581	50.7	5,661,000	715,918	669,097	253	
1924-1925	6.47	8.06	240,597	120,632	52.2	6,297,000	781,000	730,000	248	
1925-1926	6.58	8.07	237,774	122,309	53.1	6,495,686	804,644	752,020	248	
1926-1927	6.68	8.41	234,809	124,542	56.1	6,992,082	831,648	777,258	238	
1927-1928	7.00	8.37	240,769	131,534	58.6	7,707,330	920,887	860,661	239	
1928-1929	7.16	8.05	239,858	129,131	57.7	7,447,494	925,140	864,636	248	
1929-1930	7.02	8.36	242,761	133,840	58.7	7,853,439	939,287	877,858	239	
1930-1931	7.43	8.33	251,533	137,037	61.9	8,485,183	1,018,047	951,467	240	
1931-1932	7.57	8.38	251,876	139,744	63.4	8,865,323	1,057,303	988,155	239	
1932-1933	7.34	8.05	254,563	144,959	59.1	8,566,781	1,063,605	994,045	248	
1933 (Oct. 1-Dec. 31) .....	.....	.....	.....	.....	.....	.....	127,317	118,990	.....
1934	7.14	8.33	252,237	134,318	59.5	7,992,260	959,337	896,596	240	
1935	7.82	8.67	246,491	126,116	67.8	8,555,424	986,849	922,309	231	
1936	7.97	8.80	245,891	130,828	70.1	9,170,279	1,042,316	974,149	227	
1937	7.46	9.32	240,833	126,671	69.5	8,802,716	944,382	882,619	215	
1938	6.92	9.39	238,302	135,978	65.0	8,835,370	941,293	879,732	213	
1939	7.18	8.66	235,227	138,440	62.2	8,609,543	994,173	929,154	231	
1940	7.16	8.76	235,110	136,417	62.7	8,557,216	976,677	912,802	228	
1941	7.24	9.04	238,111	130,768	65.5	8,559,797	947,190	885,244	221	
1942	7.58	9.10	225,199	114,745	69.0	7,918,342	870,099	813,195	220	
1943	7.79	9.24	220,928	113,754	71.9	8,185,400	885,640	827,719	216	
1944	7.99	8.95	216,072	109,522	71.5	7,832,185	874,947	817,725	223	
1945	7.96	8.98	211,331	103,173	71.4	7,371,158	821,216	767,509	223	
1946	8.06	8.83	208,376	84,379	71.1	6,002,127	680,073	635,596	227	212,230
1947	7.72	9.11	211,624	113,020	70.3	7,942,216	872,187	815,146	220	285,190
1948	8.35	9.03	206,550	100,042	75.4	7,542,613	835,107	780,491	221	254,740
1949	8.76	8.44	213,354	108,794	73.9	8,045,941	955,890 ⁵	893,375	238	251,500
1950	8.78	8.51	220,383	109,405	74.7	8,174,821	960,961 ⁶	898,114	235	259,130
1951	9.09	8.51	221,212	109,494	77.4	8,477,201	995,759	930,636	235	270,585
1952	9.44	8.52	221,990	108,089	80.4	8,693,920	1,020,450	953,712	235	259,360
1953	10.15	8.19	221,542	108,337	83.1	9,003,967	1,099,316	1,027,421	244	287,480
1954	10.02	8.75	220,138	107,480	87.75	9,431,781	1,077,347	1,006,889	228	306,910
1955	10.74	8.66	218,819	106,180	92.94	9,867,978	1,140,112	1,065,525	231	295,550
1956	10.28	9.01	220,606	106,956	92.65	9,909,990	1,099,543	1,027,633	222	305,580
1957	10.16	8.71	221,336	106,742	88.51	9,447,647	1,084,646	1,013,710	230	303,700
1958	9.09	9.87	221,683	84,136	89.77	7,552,750	764,953	714,925	203	307,210
1959	8.83	9.66	222,588	110,371	85.31	9,416,225	974,632	910,891	207	330,790
1960	9.03	9.20	224,617	103,584	83.15	8,613,317	935,744	874,546	217	299,590
1961	10.09	8.78	227,027	108,320	88.58	9,595,342	1,092,481	1,021,033	228	329,960
1962	10.31	8.76	228,926	108,600	90.36	9,812,580	1,120,011	1,046,762	228	335,510
1963	10.25	9.12	231,321	107,436	93.39	10,033,969	1,100,768	1,028,777	219	322,610
1964	10.64	8.90	233,145	110,759	94.76	10,495,175	1,178,770	1,101,678	225	336,250
1965	11.11	8.82	235,576	109,600	97.97	10,737,507	1,217,667	1,138,033	227	340,190
1966	11.12	8.89	237,499	111,005	98.82	10,969,925	1,234,121	1,153,409	225	349,540
1967	10.65	9.27	239,813	111,837	98.74	11,045,949	1,191,042	1,113,148	216	359,170
1968	10.85	9.15	242,476	113,525	99.36	11,279,920	1,232,182	1,151,597	218	368,050
1969	10.44	9.17	242,216	113,232	95.73	10,839,272	1,182,414	1,105,060	218	340,330
1970	10.21	9.00	238,997	113,816	91.88	10,457,377	1,162,071	1,086,000	222	322,480
1971	10.62	8.69	232,278	115,810	92.26	10,685,019	1,229,976	1,149,510	230	330,227
1972	10.32	8.87	229,611	108,456	91.55	9,929,068	1,118,883	1,045,708	225	307,543
1973	10.43	8.55	226,580	108,189	89.15	9,645,452	1,128,529	1,054,723	234	301,500
1974	10.86	8.73	224,227	95,826	94.76	9,082,684	1,040,742	972,677	229	293,380
1975	10.53	8.57	221,426	105,125	90.23	9,485,299	1,107,199	1,034,788	233	301,335
1976	10.51	8.73	221,551	99,926	91.79	9,172,649	1,050,457	981,757	229	275,352
1977	10.68	8.70	220,729	96,770	92.95	8,994,388	1,033,739	966,132	230	284,349

1. Until 1934 represented period Oct. 1 through Sept. 30.

2. The average growth of a crop is from 22 to 24 months. Only a portion of the total acreage in cane is harvested each year.

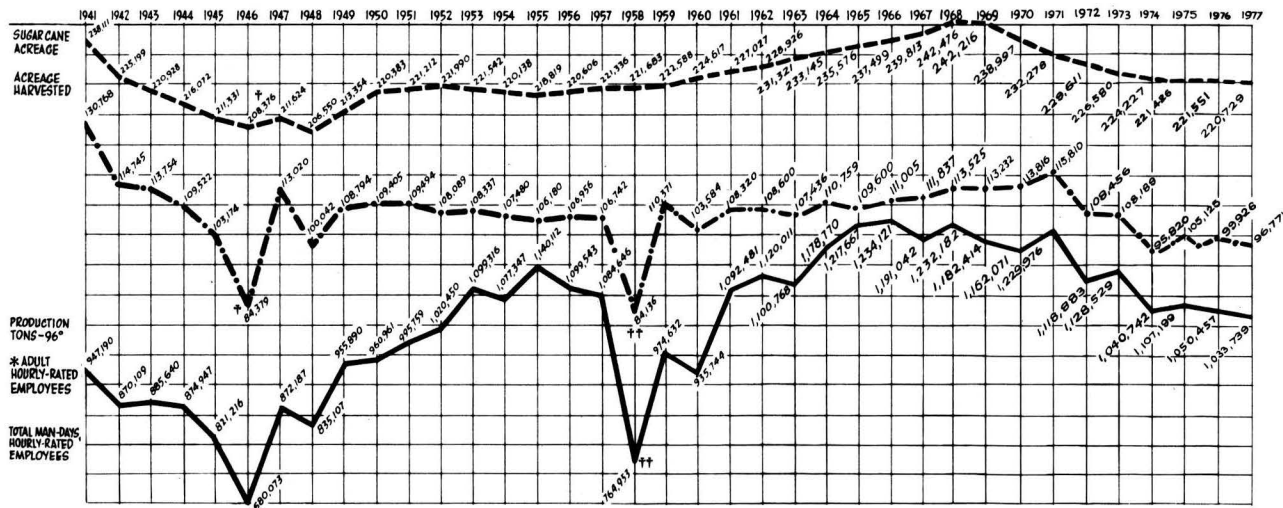
3. Converted in accordance with Sugar Regulations, Series 1, No. 1, U.S. Department of Agriculture, Agricultural Adjustment Administration, issued February 18, 1935, or Section 101(h) of the Sugar Act of 1948 or corresponding provisions of its predecessors, as the case may be.

4. 1 ton of sugar, 96° test is assumed to be equivalent to 0.9346 tons of refined.

5. Includes 2,369 tons raw sugar produced from volunteer cane for which no acreage shown.

6. Includes 2,690 tons raw value sugar produced from volunteer cane for which no acreage shown.

HAWAIIAN SUGARCANE ACREAGE, ACREAGE HARVESTED, AND PRODUCTION



1946: INDUSTRY-WIDE STRIKE, 2½ MONTHS

1958: INDUSTRY-WIDE STRIKE, 4 MONTHS

1969: INDUSTRY-WIDE STRIKE, 5 WEEKS

1974: INDUSTRY-WIDE STRIKE, 6 WEEKS

1977: INDUSTRY-WIDE STRIKE, 3 WEEKS



The Robert L. Cushing Building in Aiea, Hawaii. At the annual meeting in 1977, the Board of Directors named the Aiea building the "Robert L. Cushing Building" in recognition of Mr. Cushing's services to the Association.

HAWAIIAN SUGAR PLANTERS' ASSOCIATION

The Hawaiian Sugar Planters' Association is a voluntary, non-profit, unincorporated association for "the maintenance, advancement, improvement and protection of the sugar industry in Hawaii, the support of an Experiment Station, and the doing of all such matters and things as shall be incidental to such purposes and objects."

Plantation members of the Association are those companies in Hawaii engaged primarily in the business of raising sugarcane and manufacturing sugar from it. Active members are elected from among individuals who are directly connected with the direction, management, or operation of the sugar companies.

The Association carries out many of its activities through standing committees and these are: Accounting, Environmental Standards, Industrial Relations, Insurance, Land and Water, Legislative, Public Relations, Tax, and Experiment Station Advisory.

EXPERIMENT STATION

The Association's largest program is the Experiment Station which conducts research on basic physiology and biochemistry of the sugarcane plant; on cultural practices, including methods of

planting, fertilizing and irrigating; on breeding and selection of new sugarcane varieties; on the control of pests, including insects, weeds, diseases and rats; on chemistry, including methods of analysis for plant and soil constituents, for pesticide residues and for other purposes as needed; on sugarcane factory processes and process control; on sugar recovery from milling sugarcane; on raw sugar quality; and on the design and engineering of equipment, both field and factory.

In addition to its research, the Experiment Station provides some services to its member companies such as routine analyses of raw sugar and molasses, including determinations of pol, moisture, color, filterability, grain size and ash; plant and soil analyses to determine fertilizer needs; the repair and calibration of sugar factory instruments; field, factory, and factory laboratory audits; and short courses for training employees of member companies.

The Experiment Station has a large library, consisting of reference volumes and periodicals on sugarcane growing and milling, as well as on general agriculture, chemistry and engineering.

The Experiment Station maintains and operates substations on Oahu, Kauai, Maui and Hawaii. There are two principal substations on Oahu, one at Kunia for general research and one at Maunawili for

the maintenance of parent material and for the crossing of sugarcane varieties for the development of new varieties. Substations on Kauai, Maui and Hawaii provide areas in which seedlings from the breeding program can be grown and evaluated and where some other agricultural research can be done.

The Experiment Station can now offer its services for sale in other sugarcane growing areas or for any agricultural problem to which its capabilities can be applied. These services include consulting on all agricultural problems, the conduct of experiments either in the Association's laboratories or in the area in question, and the Station can offer sugarcane hybridization to the order of the customer. Information on these services can be obtained from the Experiment Station Director.

WASHINGTON REPRESENTATIVE

The Association maintains an office in Washington, D. C. where a vice president represents the member companies' interests in federal legislative actions and in the actions of federal administrative and regulatory departments.

REFINING AND MARKETING HAWAII'S CANE SUGAR

California and Hawaiian Sugar Company, San Francisco markets all the raw cane sugar and molasses produced in the state of Hawaii. It is the nation's second largest marketer of refined sugar and is the only U.S. refined cane sugar producer west of the Texas Gulf Coast.

ORGANIZATION

Best known by its brand name, "C and H", the company is an agricultural marketing association as defined by the Capper-Volstead Act, which authorizes formation of cooperative marketing associations by producers of agricultural products.

C and H stock is owned by 15-member sugar producing companies in Hawaii in substantially the same proportions as the tonnage each markets through the association.

The company also serves as refining and marketing agency for the 500-600 independent sugarcane farmers in Hawaii.

All proceeds of sugar and molasses sales, less only authorized costs of operation, are returned to member companies and sugarcane growers represented by C and H.

HISTORY

In 1906 Hawaiian producers, representing more than 80 per cent of the islands' production, acquired a refinery at Crockett, California and formed C and H to compete for sales in the U.S. refined sugar market. Their's was a successful effort to overcome price discrimination against Hawaiian raw sugar practiced by a "sugar trust" which existed among mainland sugar refiners at that time.

Originally a commercial corporation, C and H was reorganized along cooperative lines in 1921. Since 1948 it has marketed Hawaii's entire cane sugar and molasses output.

OPERATIONS

C and H accepts Hawaii's production for shipment to the mainland at the sugar factories. It has capacity in its two refineries to refine about 1 million tons of raw sugar annually. Raw sugar not required for C and H refining operations is sold to other refiners. Molasses is sold by C and H to distributors primarily for use in animal feed.

The C and H refinery at Crockett, California near San Francisco, which began operations in 1906, has been developed until it is acknowledged as the largest in the world. It has capacity to melt some 960,000 tons of raw sugar annually.

A smaller C and H refinery at Aiea near Honolulu can process about 40,000 tons of raw sugar a year, primarily to supply Hawaii's refined sugar requirements.

Raw sugar is delivered from Hawaii to Crockett in bulk cargo ships carrying from 16,000 to 31,000 tons of raw sugar per voyage. Raw sugar is mechanically discharged into refinery storage bins which have capacity for more than 100,000 tons.

PRODUCTION

The Crockett refinery operates the year around, three shifts a day in 10-day production cycles, followed by four-day shut-downs.

Refined sugars are produced in more than 100 types, grades and package sizes. In addition to an unsurpassed variety of packaged sugars for the grocery trade, sugars are produced for industrial use in packaged, bulk granulated and liquid form. High speed packaging equipment can turn out more than a million consumer-size packages of refined sugar daily.

STORAGE AND DISTRIBUTION

The refinery has storage facilities for approximately 55,000 tons of packaged, dry bulk and liquid sugars. Most customers receive shipments directly from the refinery by rail or truck. However, to expedite service to many customers, C and H maintains inventories of packaged sugars in some 30 public warehouses strategically located throughout the company's marketing territory. In addition, liquid and bulk sugar distribution depots are maintained in Portland, Oregon and Los Angeles, California; and liquid sugar facilities in Phoenix, Arizona.

MARKETING

C and H brand sugar is normally sold in two-thirds of the mainland, generally from the Mississippi River Valley to the Pacific Coast and from along the Canadian border to the Mexican border, plus Hawaii and Alaska. Sugars bearing the C and H trademark are more widely distributed in this region than any of the competing brands.

Competition for sugar sales throughout the region, with beet sugar producers and southern cane and eastern cane refiners, is intense. A majority of the nation's 51 beet sugar factories are located in the 11 western states, most of the others eastward to the Mississippi and in the Upper Midwest. Their loca-

tion provides a significant freight advantage. Cane sugar refineries are located in the Gulf region, Southeast and Eastern Seaboard.

C and H marketing is carried out through sales offices in San Francisco, Oakland and Los Angeles, California and through food brokers' offices in major cities from the Northwest into the Midwest.

Intensifying competition in recent years has been the advent of private labels in packaged consumer items, generally sold at a discount below advertised labels. Some of this form of marketing developed as a response to the "brand franchise," or superior consumer acceptance of the C and H brand in a number of major markets. C and H has, however, been able through strong sales and promotion efforts to maintain its share of the market. The

greatest impact of private labels has been, however, a depressant on prevailing market price levels, since the private labels generally are sold at a discount below established brands.

GENERAL

Over the past decade, annual C and H sales have averaged about \$350 million, and have returned an average of more than \$260 million annually to Hawaii's producers. The company employs approximately 1,600 persons in mainland operations and has about 70 employees at the Aiea refinery. Payroll totals approximately \$28 million annually.

Robert O. Nagle is president and chief executive officer of C and H. Company headquarters are at One California Street, San Francisco, 94106.

IMPORTANT HISTORICAL DATES

- | | |
|--|---|
| <p>1825 First sugarcane plantation attempted in Manoa Valley, Oahu.</p> <p>1835 Ladd & Company founded first successful plantation, Koloa on Kauai.</p> <p>1837 First Koloa sugar, 2.1 tons.</p> <p>1838 Twenty sugar mills in operation, 18 animal powered, 2 water.</p> <p>1852 Arrival of first Chinese laborers. First sugar centrifugal introduced, Makawao Plantation.</p> <p>1853 First steam engine, Koloa.</p> <p>1857 Irrigation introduced, Lihue.</p> <p>1859 First steam mill, Lihue.</p> <p>1860 Judd and Wilder established first mill on Oahu, Kualoa Plantation.</p> <p>1863 Pepeekeo introduced vacuum pan.</p> <p>1868 First Japanese laborers arrived.</p> <p>1876 Reciprocal trade treaty, Kingdom of Hawaii and United States, admitted sugar duty free. Alexander & Baldwin built Hamakua Ditch at cost of \$80,000, first large-scale irrigation on islands, 17 miles long and producing 40,000,000 gallons a day.</p> <p>1878 Portuguese immigrants arrived.</p> <p>1879 Ewa drilled first artesian well; Onomea pioneered with commercial fertilizer.</p> <p>1881 German immigrants arrived at Lihue; Hamakua bought first steam plow.</p> <p>1882 Planters' Labor & Supply Co. organized.</p> <p>1886 First 100,000-ton crop.</p> <p>1895 Planters' Labor and Supply Co. dissolved and members immediately organized as Hawaiian Sugar Planters' Association. HSPA Experiment Station started and first chemist hired. Makee inaugurated night grinding. Ewa installed 9-roller mill.</p> | <p>1897 First 250,000-ton crop.</p> <p>1898 Hawaii annexed to United States.</p> <p>1904 Leaf hopper parasites introduced from Australia.</p> <p>1905 H-109 variety of cane germinated from seedling.</p> <p>1906 Califorma & Hawaiian Sugar Refining Corp. founded; Filipino immigration.</p> <p>1907 Oahu Sugar Co. installed first 12-roller mill.</p> <p>1910 Kilauea introduced gasoline tractor. Cane borer parasite introduced from New Guinea.</p> <p>1916 Anomala beetle parasite introduced from the Philippines.</p> <p>1920 Leaf hopper completely controlled by egg-sucking parasite introduced from Australia and Fiji.</p> <p>1922 First commercial-scale mechanical loading of cane by self-propelled vehicle.</p> <p>1923 First Dorr Clarifiers (2 factories).</p> <p>1924 First of series of ten consecutive record crops.</p> <p>1926 First Oliver Filter, Oahu Sugar Company.</p> <p>1928 Establishment of sugarcane quarantine station on Island of Molokai.</p> <p>1932 First million-ton crop; <i>bufo marinus</i>, insectivorous frog, brought to Territory to control pests.</p> <p>1934 First high-speed sugar centrifugals—Waialua.</p> <p>1935 Long-line irrigation widely adopted by plantations.</p> <p>1936 First major use of trucks for cane hauling. HSPA insect and plant disease quarantine started on Midway Island.</p> <p>1937 Expedition to New Guinea to collect wild sugarcanes for breeding. Mechanical harvesting begun at Ewa Plantation. Develop-</p> |
|--|---|

- ment of "prebaiting" technique of rat control. Research on food yeast from molasses. Mechanical harvesting by "grabs" started —Ewa Plantation.
- 1940 Kaiwika Sugar Co. was first plantation in Hawaii to transport 100 percent of its cane to mill by trucks.
- 1941 32-8560 displaces H-109 as leading variety. First precision refractometer for factory control.
- 1942 New armyworm parasite brought from Texas. Plantation operations subordinated to defense requirements. War brings acute shortage of labor and equipment, resulting in forced use of all known types of mechanization. First bulk sugar plant began operating at Kahului, Maui.
- 1945 Development of activated diesel oil emulsion for weed control. Organization of the Agricultural Engineering Research Department to consolidate and expand research development. HSPA furnished \$100,000 to finance University of Hawaii Agricultural Engineering Institute buildings and equipment. Ion exchange research started.
- 1946 Production reduced severely by two-and-a-half month strike.
- 1947 Plantation railroads rapidly being replaced with trucks. Field testing started on several types of cane cutters. Ion exchange pilot plant in operation.
- 1948 V-cutter and side-mounted cutter for unirrigated cane and 2-line cutter for irrigated cane developed. Chemical weed control with pre-emergence and contact herbicides used on all plantations.
- 1949 Second bulk sugar plant began operating at Hilo, Hawaii.
- 1950 First commercial models of HSPA-developed harvesting machines for both irrigated and unirrigated plantations put into operation at three plantations; third bulk sugar plant began operating at Nawiliwili, Kauai; aluminum flumes used on a field scale for irrigation and cane transport.
- 1951 By-products pilot plant installed at Oahu Sugar Co., Ltd.; direct-mounted cane cutter and infield transport machine for unirrigated plantations developed; 37-1933 replaces 32-8560 as leading cane variety; radioactive materials used in irrigation and fertilization experiments; 40-hour week for half the year established on plantations; first bulk raw sugar shipments made to east coast. Aerial fertilization began.
- 1952 Cane buggy adopted by Hilo Coast plantations.
- 1953 First commercial application of liquid nitrogen fertilizer (aqua ammonia) made at Ewa Plantation Co.; Kauai and Maui plantations hit hardest by one of the Territory's worst droughts.
- 1954 First industry-wide pension plan established; HSPA corrosion inhibitor developed; 124-acre arboretum deeded to the University of Hawaii; HSPA meteorologists participate in Project Shower, "warm" rainfall study.
- 1955 Bulk sugar storage-loading plant completed at Honolulu.
- 1956 California & Hawaiian Sugar Company celebrated its fiftieth anniversary. Total half-century production came to nearly 25 million tons of raw sugar refined.
- 1958 Four-month-long, industry-wide strike drastically reduced production.
- 1959 Tenth Congress of International Society of Sugar Cane Technologists held in Honolulu.
- 1960 Variety 44-3098 replaced 37-1933 as leading cane variety.
- 1961 Production, reduced for three years by the 1958 strike, returned to normal levels.
- 1962 Hakalau Sugar Company was merged into Pepeekeo Sugar Company, reducing the number of sugar companies to 25. Variety 50-7209 replaced 44-3098 as leading cane variety.
- 1964 First sugarcane diffuser began commercial operation at Pioneer Mill.
- 1965 Hilo Sugar Co. and Onomea Sugar Co. merge to form Mauna Kea Sugar Co.
- 1966 Record raw sugar crop of 1,234,121 tons was produced.
- 1967 First commercial model of HSPA developed sugarcane drycleaner tested at Laupahoehoe Sugar Co.
- 1969 Five-week industry-wide strike over terms of new three-year contracts.
- 1970 First commercial sugarcane drycleaner installed at Paauhau Sugar Co. on Hawaii Island.
- 1971 Months-long West Coast Longshoremen's strike stops shipments to C and H, disrupts C and H marketing program, and creates raw sugar and molasses storage problems in Hawaii. Smut disease discovered on Oahu.
- 1972 Subsurface and drip irrigation research intensified. Smut infection found on more than 5,000 acres on Oahu. Molokai quarantine station closed. USDA agrees to undertake 2-year quarantine for Hawaii canes at Beltsville, Maryland. Hutchinson Sugar Co. and Hawaiian Agricultural Co. merged to form Ka'u Sugar Company, reducing number of sugar companies to 18. Hilo Coast Processing Company organized as a sugar processing cooperative to mill cane produced by Mauna Kea Sugar Co. and members of United Cane Planters' Cooperative.
- 1973 Smut testing of 8,000 varieties completed. Top two varieties, 50-7209 and 59-3775 remain uninfected. First temporary registration for chemical ripener for sugarcane obtained. Nearly 3,000 acres of furrow-

irrigated lands converted to flat culture by installing drip irrigation. Harvesting methods field trials stepped up. Success obtained with HSPA rock-removal cane dry-cleaner tested at Pioneer Mill Company, Ltd. First voyage of new ship, Sugar Islander, leased by California and Hawaiian Sugar Co. to take Hawaii sugar to the mainland. Grove Farm announced it was going out of sugarcane operations. Grove Farm sugarcane lands and leases were taken over by McBryde Sugar Co. and The Lihue Plantation Co.

Paauhau Sugar Co. purchased by Honokaa Sugar Co.

- 1974 Variety 59-3775, developed by HSPA geneticists, became the most widely planted sugarcane within the State. Industry-wide strike closed all but Kohala Sugar Co. from March 9 through April 23. Plans were prepared for new HSPA facility in Aiea on same site as the C and H refinery. Sugar Act expired midnight, December 31.

Hamakua Mill Co. merged into Laupahoe-hoe Sugar Co.

- 1975 HSPA offices and Experiment Station moved from Makiki to new \$5 million facility in Aiea. An additional \$600,000 was spent for modernizing and equipping the HSPA breeding station at Maunawili. Kohala Sugar Company was closed at the end of the 1975 grinding season. A total of 46,822 tons Hawaiian raw sugar was sold by California and Hawaiian Sugar Company to Japanese buyers.

- 1976 Hilo Coast Processing Co. closes Wainaku Mill as improvements to conform with EPA regulations completed at company's two

other factories—Pepeekeo and Papaikou. Drought continued through 1976 and caused lower raw sugar production. Raw sugar prices in the United States reduced returns to Hawaiian producers. Companies announced reductions in force and measures to economize. On September 26, 1976 the President increased tariff on imported raw sugar from .625 cents per lb. to 1.875 cents per pound. Senate and President request investigation by United States International Trade Commission on effect of imports of raw sugar on domestic producers.

- 1977 U.S. International Trade Commission finds imports harming U.S. domestic producers; recommends reduced import quotas. May 4 President Carter announced "interim program" of direct support payments to producers of sugar from sugar beets and sugarcane in the U.S. Representative de la Garza (Texas) offers amendment to the Food and Agriculture Act of 1977. Later adopted by conference committee and by both Houses, adding sugar to list of commodities eligible for loan or purchase under Commodity Credit Corporation programs. President signs Food and Agriculture Act of 1977, September 29, 1977, thus terminating the interim payment program. President announced increased duty and import fee on November 12, 1977, carrying out intent of Congress expressed in Conference Report on de la Garza. In spite of these actions, record quantities of raw and refined sugar imported into the U.S. Three-week industry-wide strike in November, 1977. Extended drought conditions; reservoirs and ditch flows below normal.

Part II

U.S. SUGAR INDUSTRY

America's sugar needs are met by a variety of sources, both domestic and foreign. Including Hawaii, 20 states produce sugar. Other states, which do not produce sugar themselves, have sugar refineries.

In 1977 the United States produced about 56% of its sugar requirements, obtaining the balance by import of raws from foreign producers. Of the approximately 6.3 million tons produced in the U.S., 3.5 million tons were from beets and 2.8 million tons from cane.

Sugar beets are grown in 17 states and there are beet processing factories in 16 states (see map below).

Sugarcane is grown and processed in the states of Florida, Hawaii, Louisiana and Texas and also in the Commonwealth of Puerto Rico.

Foreign raw sugar, all produced from sugarcane, is received at refineries located in principal port cities on the East Coast and the Gulf of Mexico. For the first time in many years, it was possible, during a portion of 1977, to import refined sugar into the United States with no tariff penalty or limitation. Accordingly, in 1977 a record 271,944 tons of direct-consumption sugar was imported, in addition to 6.1 million tons of raw sugar. Sugar was imported from a total of 35 foreign countries, although the amount from some of them was very small. During most of 1977, the tariff on imported raw sugar was at the rate of 1.875 cents per pound but on November 12, 1977 the President, by proclamation, increased this to 2.8125 cents per pound (96° basis) and also established an import fee of 3.32

cents per pound. (The import fee could not exceed 50% ad valorem and was reduced by the value in excess of 6.67 cents per pound.) This was later modified in early 1978 to provide a fixed import fee of 2.7 cents per pound for raw sugar and 3.22 cents per pound for refined sugar.

Total refined sugar deliveries in the United States in 1977 were 10,352,000 tons. Of this, approximately 6.65 million tons were used in industrially-produced products, such as soft drinks, bakery goods, ice cream, candy, canned foods and preserving. The remaining approximately 3.5 million tons was used at home and in meals served in restaurants and institutions.

BEET SUGAR INDUSTRY

About 56% of the sugar produced in the United States in 1977 came from sugar beets. Grown mostly by small farmers in 17 states, the beets are sold under contract to 12 sugar beet processing companies operating a total of 51 factories.

Production of sugar from sugar beets in the United States has grown dramatically in the little more than 100 years since the first successful sugar beet processing plant began operations near San Francisco, California in 1870.

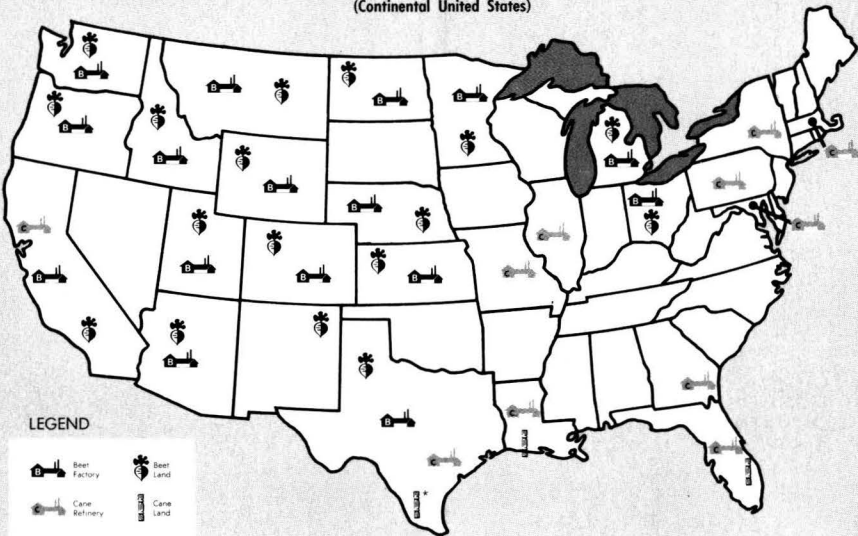
CANE SUGAR REFINING INDUSTRY

Of all the refined sugar consumed in the United States, almost 70% comes from sugarcane. In 1977 U.S. sugarcane producers turned out 2,727,000 tons while about 6,400,000 tons were imported from foreign producers.

Most of this cane sugar was refined in the 22 refineries located principally on the East and

Continued on page 22

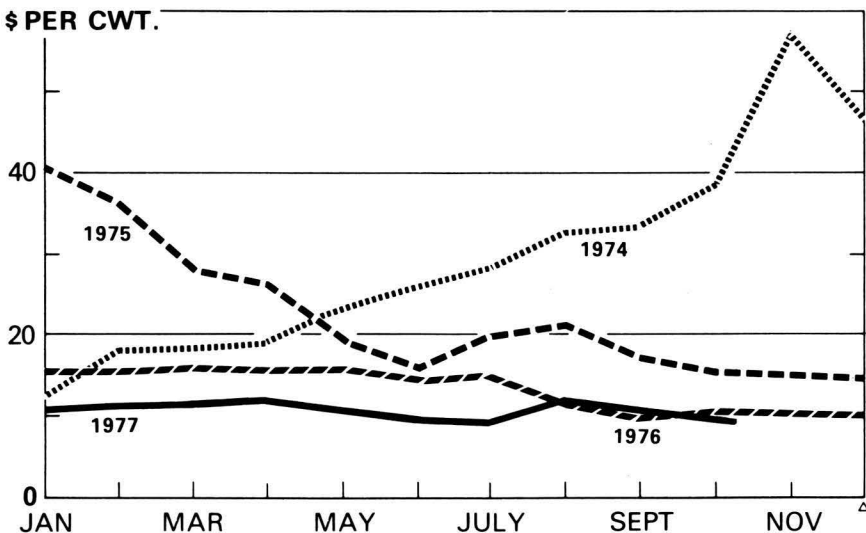
MAJOR SUGARCANE, SUGARBEET PRODUCING AREAS; & STATES REFINING SUGARCANE OR BEETS
(Continental United States)



*Starting 1973

U.S. RAW SUGAR PRICES*

\$ PER CWT.

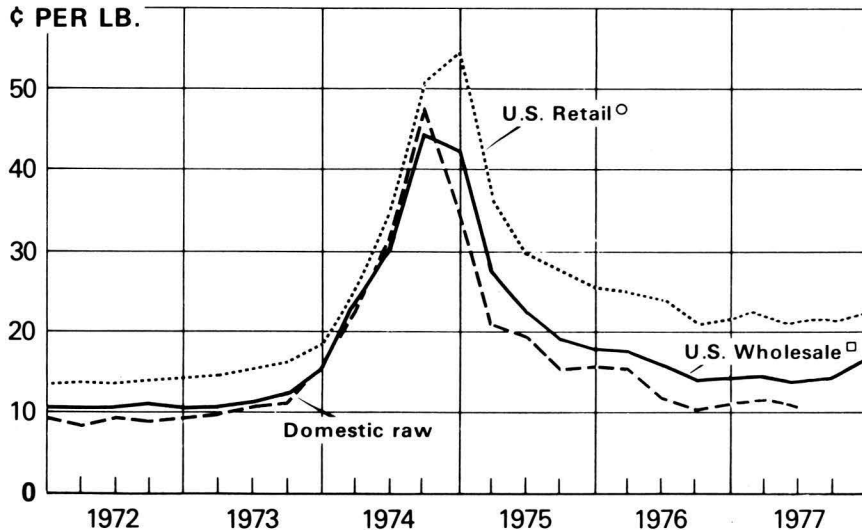


*New York Spot. Discontinued Nov. 1977

Adapted from figure S-2, USDA Sugar and Sweetener Report, Vol. 2, pg. 9, May 1977 and data from figure S-4, SSR Vol. 3, pg. 15, Feb. 1978.

U.S. SUGAR PRICES

¢ PER LB.



BULK RAW SUGAR - NEW YORK DUTY PAID EQUIVALENT. ○ FIVE POUND PACKAGE - BLS DATA.
 □ BULK, DRY BEET SUGAR, f.o.b. PLANT IN COLORADO - BLS DATA.

*Discontinued Nov. 1977.

Adapted from figure S-6, USDA Sugar and Sweetener Report, Vol. 3, pg. 17, Feb. 1978.

PRIMARY DISTRIBUTION OF SUGAR CONTINENTAL UNITED STATES, BY REGION JANUARY-DECEMBER 1977

Region	Cane Sugar Refiners	Beet Sugar Processors	Mainland Cane Sugar Mills	Total	Imports of Direct-Consumption Sugar
Short Tons¹					
New England	357,450	13,000	0	370,450	
Mid-Atlantic	1,631,550	73,400	1,250	1,704,950	
North Central	1,613,600	1,936,750	13,900	3,550,350	
Southern	2,954,850	160,850	2,150	3,115,700	
Western	494,750	1,095,750	0	1,590,500	
Unspecified	0	3,100	0	3,100	
Grand Total	7,052,200	3,282,850	17,300	10,335,050	271,944

¹Reported as produced or imported and delivered except liquid sugar which is on a sugar solids content basis.

Source: U.S. Department of Agriculture, Sugar and Sweetener Report, Vol.3 (3), March 1978.

SUGAR DELIVERIES, BY TYPE OF PRODUCT OR BUSINESS OF BUYER AND BY TYPE OF SUGAR, CALENDAR YEAR 1977 UNITED STATES

Product or Business of Buyer	Beet (Total)	Cane (Total)	Total All Sugar	Liquid Sugar Included in Totals	
				Beet	Cane
Short Tons ¹					
INDUSTRIAL					
Bakery, cereal and allied products	546,731	785,337	1,332,068	7,172	84,929
Confectionery and related products	320,959	598,591	919,550	7,255	90,443
Ice cream and dairy products	204,771	340,918	545,689	84,960	236,347
Beverages	582,904	1,813,017	2,395,921	276,917	1,040,051
Canned, bottled, frozen foods, jams, jellies and preserves	340,975	369,050	710,025	105,986	189,397
Multiple and all other food uses	191,653	331,251	522,904	9,729	63,296
Non-food products	16,809	85,580	102,389	324	27,305
SUB-TOTAL	2,204,802	4,323,744	6,528,546	492,343	1,731,768
NON-INDUSTRIAL					
Hotels, restaurants, institutions	7,072	62,466	69,538	53	5,673
Wholesale grocers, jobbers, sugar dealers	625,984	1,407,401	2,033,385	13,099	42,153
Retail grocers, chain stores, super markets	259,905	1,001,861	1,261,766	9,379	7,568
All other deliveries, including deliveries to Government agencies	30,849	114,191	145,041	2,921	10,782
SUB-TOTAL	923,810	2,585,919	3,509,729	25,452	66,176
Unspecified	154,213	159,837	314,050	.....	.....
TOTAL DELIVERIES	3,282,825	7,069,500	10,352,325	517,795	1,797,944
Deliveries in consumer-size packages (less than 50 lbs.)					
Deliveries in bulk (unpackaged)	448,358	2,011,437	2,459,795	.....	.....
	1,664,761	1,865,223	3,529,984	.....	.....

¹Reported as produced or imported and delivered except liquid sugar which is on a sugar solids content basis.

Source: U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 3 (4), April 1978.

**SUGARBEETS: ACREAGE, PRODUCTION, SEASON AVERAGE
PRICE PER TON RECEIVED BY FARMS AND VALUE;
AND PRODUCTION OF BEET SUGAR IN THE UNITED STATES**

Year	Acreage Planted 1,000 acres	Acreage Harvested 1,000 acres	Average Yield Per Acre short tons	Production 1,000 short tons	Price ¹ Dollars per ton	Farm Value ¹ 1,000 Dollars	Sugar produced (refined basis) 1,000 short tons
1940.....	971	912	13.4	12,194	5.11	62,287	1,758
1941.....	796	755	13.7	10,342	6.43	66,522	1,488
1942.....	1,048	954	12.2	11,685	6.84	79,905	1,617
1943.....	619	550	11.9	6,547	8.81	57,674	935
1944.....	633	555	12.1	6,718	10.60	71,156	979
1945.....	775	713	12.1	8,616	10.20	87,539	1,191
1946.....	905	802	13.2	10,582	11.10	117,840	1,422
1947.....	968	879	14.2	12,503	11.80	148,080	1,719
1948.....	800	694	13.6	9,424	10.60	99,639	1,280
1949.....	768	687	14.8	10,196	10.80	110,369	1,461
1950.....	1,014	925	14.6	13,535	11.20	151,293	1,878
1951.....	758	691	15.2	10,482	11.70	122,483	1,448
1952.....	719	665	15.3	10,169	12.00	121,970	1,407
1953.....	794	745	16.2	12,084	11.60	140,364	1,697
1954.....	964	876	16.1	14,082	10.80	152,151	1,909
1955.....	798	740	16.5	12,228	11.20	136,477	1,625
1956.....	831	785	16.6	12,993	11.90	155,087	1,837
1957.....	918	880	17.7	15,530	11.20	174,261	2,050
1958.....	935	891	17.0	15,150	11.70	177,807	2,056
1959.....	955	905	18.8	17,015	11.20	191,186	2,187
1960.....	977	957	17.2	16,421	11.60	190,109	2,291
1961.....	1,129	1,077	16.4	17,704	11.20	197,547	2,247
1962.....	1,182	1,103	16.5	18,254	12.80	233,243	2,417
1963.....	1,285	1,235	18.9	23,328	12.20	285,011	2,893
1964.....	1,460	1,395	16.8	23,389	11.80	275,660	3,073
1965.....	1,314	1,249	16.8	20,915	11.95	249,836	2,705
1966.....	1,240	1,161	17.5	20,342	12.80	260,355	2,643
1967.....	1,197	1,122	17.1	19,197	13.55	260,114	2,464
1968.....	1,476	1,410	18.0	25,363	13.81	350,207	3,255
1969.....	1,647	1,541	18.0	27,736	12.72	352,863	3,112
1970.....	1,483	1,419	18.6	26,427	14.84	390,813	3,179
1971.....	1,406	1,342	20.2	27,096	15.40	416,279	3,320
1972.....	1,420	1,329	21.4	28,410	16.00	455,830	3,387
1973.....	1,280	1,218	20.1	24,499	29.60	725,661	2,990
1974.....	1,252	1,213	18.2	22,123	46.80	1,035,567	2,725
1975.....	1,595	1,517	19.6	29,704	27.60	820,743	3,756
1976.....	1,525	1,479	19.9	29,386	21.00	616,813	3,640
1977 ²	1,277	1,218	20.6	25,115	N.A.	N.A.	3,148

¹Includes production incentive payments which were payments made to producers of sugar beets and sugarcane by the Commodity Credit Corporation during the period of government price control in World War II, to stimulate production, but excludes Sugar Act payments.

²Preliminary

Source: 1940-1959—Agricultural Statistics, 1972, Table 114, USDA, Washington. 1960-1974—Agricultural Statistics, 1976, Table 98, USDA, Washington; 1975—Agricultural Statistics Table 104, USDA 1977; Beginning 1976—Crop Production and Crop Values, USDA, Economic Statistics and Cooperatives Service.

Continued from page 18

Gulf Coasts and the one large refinery near San Francisco.

Cane sugar refining is one of America's oldest industries, having begun prior to the American Revolution. Information provided by the U.S. Cane Sugar Refiners' Association indicates a current total capital investment of approximately \$500 million in buildings, machinery, docks, land and other physical properties. The Association says sugar refining provides direct employment to more than 17,500 persons, with an annual payroll of \$100 million. The refineries are supplied with raw sugar from U.S. producers and with imports literally from the four corners of the globe. (See table on page 00.)

The 14 companies that operate sugar refineries and the location of their refineries are as follows:

Revere Sugar Corporation	Brooklyn, N.Y. Chicago, Ill. Charlestown, Mass.
Amstar Corp.	Boston, Mass. Brooklyn, N.Y. Philadelphia, Pa. Baltimore, Md. Arabi, La.
Supreme Sugar Co. Inc.	Supreme, La.
California and Hawaiian Sugar Co.	Crockett, Calif. Aiea, Hawaii
Colonial Sugars Co.	Gramercy, La.
Everglades Sugar Refinery, Inc.	Clewiston, Fla.
Florida Sugar Refinery, Inc.	Belle Glade, Fla.
Godchaux-Henderson Sugar Co., Inc.	Reserve, La.
Imperial Sugar Co.	Sugar Land, Texas
Industrial Sugars, Inc.	St. Louis, Mo.
The National Sugar Refining Co.	Philadelphia, Pa.
Refined Syrups & Sugars, Inc.	Yonkers, N.Y.
Savannah Sugar Refining Corp.	Port Wentworth, Ga.
The South Coast Corp.	Mathews, La.

Source: U.S. Cane Sugar Refiners' Association.

CORN SWEETENERS

Corn sweeteners, consisting of corn syrup and dextrose, have contributed substantially to total caloric sweetener use in the United States for many years. During the past 16 years, however, consumption of corn sweeteners has increased from about 13 lbs per capita to 32 lbs per capita. Consumption of other caloric sweeteners—sugar, honey and other syrups—has declined slightly during the same period.

The development of high fructose corn syrup (HFCS) has added a new corn product that is competitive with sugar for many industrial uses. This product was first introduced in 1972 and is now used to the extent of 9.0 lbs per capita. The table on the following page reports per capita use of all sweeteners in the United States for the period 1961-77.

Based on estimates of the proportion of total corn syrup consumption that consisted of HFCS, U.S. consumption of HFCS has increased from 100,000 tons in 1972 to about 1 million tons in 1977. There are varying estimates as to what projected consumption of HFCS will be over the next several years. This will depend on many factors but, obviously, primarily on the relative price for sugar and HFCS.

A U.S. Department of Agriculture report shows HFCS averaging 12.4 cents per pound in the "Chicago-West" territory in 1977. Beet sugar was reported to be quoted at 14.7 cents per pound (f.o.b. plant) average for 1977.

The first HFCS products were approximately 42% fructose, 50% dextrose and 8% other saccharides. A second generation of products has been developed, however, with 55% fructose, and this product may be more competitive with sucrose for some industrial uses than was the 42% fructose product.

CALORIC AND NON CALORIC SWEETENERS: PER CAPITA U.S. CONSUMPTION, 1961-77

Calendar	Refined cane and beet sugar						Corn sweeteners ¹				Minor caloric ¹			Total caloric	Noncaloric sweeteners ²		
	U.S. grown sugar			Cane sugar		Total	Corn syrup		Dex-trose	Total	Honey	Edible syrups	Total		Sac-charin	Cyclamate	Total non-caloric
	Beet sugar	Cane sugar	Total	Im-ported	Total		High-fructose	Other									
Pounds																	
1961	26.1	28.7	54.8	43.0	71.7	97.8	—	8.6	3.4	12.0	1.1	.8	1.9	111.7	2.1	.4	2.5
1962	24.5	27.4	51.9	46.0	73.4	97.9	—	9.3	3.6	12.9	1.1	.9	2.0	112.8	2.5	.4	2.9
1963	27.2	28.2	55.4	41.9	70.1	97.3	—	9.9	4.3	14.2	1.1	.7	1.8	113.3	3.0	.7	3.7
1964	28.6	30.3	58.9	37.9	68.2	96.8	—	10.9	4.1	15.0	1.0	.7	1.7	113.5	3.5	1.3	4.8
1965	29.1	30.1	59.2	37.8	67.9	97.0	—	11.0	4.1	15.1	1.1	.7	1.8	113.9	4.0	1.7	5.7
1966	28.3	28.7	57.0	40.3	69.0	97.3	—	11.2	4.2	15.4	1.0	.7	1.7	114.4	4.5	1.9	6.4
1967	26.6	29.6	56.2	42.3	71.9	98.5	—	11.9	4.2	16.1	.9	.5	1.4	116.0	4.8	2.1	6.9
1968	27.8	26.8	54.6	44.6	71.4	99.2	—	12.6	4.3	16.9	.9	.7	1.6	117.7	5.0	2.2	7.2
1969	30.3	25.3	55.6	45.4	70.7	101.0	—	13.2	4.5	17.7	1.0	.6	1.6	120.3	5.3	1.6	6.9
1970	31.3	25.0	56.3	45.5	70.5	101.8	—	14.0	4.6	18.6	1.0	.5	1.5	121.9	6.2	(³)	6.2
1971	31.1	22.8	53.9	48.5	71.3	102.4	—	15.0	5.0	20.0	.9	.5	1.4	123.8	5.7	(³)	5.7
1972	30.4	25.4	55.8	47.0	72.4	102.8	0.9	15.6	4.4	20.9	1.0	.5	1.5	125.2	5.7	(³)	5.7
1973	30.4	24.9	55.3	46.2	71.1	101.5	1.4	16.7	4.8	22.9	.9	.5	1.4	125.8	5.7	(³)	5.7
1974	26.1	21.0	47.1	49.5	70.5	96.6	2.3	17.4	4.9	24.6	.8	.4	1.2	122.4	7.0	(³)	7.0
1975	30.5	24.9	55.4	34.8	59.7	90.2	4.7	17.7	5.1	27.5	.9	.4	1.3	119.0	7.0	(³)	7.0
1976 ⁴	32.5	22.7	55.2	39.5	62.2	94.7	7.1	17.7	5.1	29.9	1.0	.4	1.4	126.0	8.0	(³)	8.0
1977 ⁵	30.6	22.0	52.6	43.1	65.1	95.7	9.0	17.7	5.1	31.8	.9	.4	1.3	128.8	9.0	(³)	9.0

¹Dry basis. Recent corn sweetener consumption may be understated due to incomplete data.

²Sugar sweetness equivalent—assumes saccharin is 300 times as sweet as sugar, and cyclamate is 30 times as sweet as sugar.

³Cyclamate food use was banned by the Food and Drug Administration, effective in 1970.

⁴Preliminary.

⁵Estimate.

Source: U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 3 (2), February 1978.

LOUISIANA—SUGAR PRODUCTION—ACREAGE—YIELD

Crop Year	Sugarcane Used for Sugar			Sugar Produced		Raw Sugar 96 ^o made per ton of sugarcane (Pounds) ¹
	Acreage harvested (1000 acres)	Average yield of cane per acre (Tons)	Production (1,000 tons)	(In thousands Raw Value Basis ¹	of short tons) Equivalent refined ²	
1939-40	234	21.7	5,084	436	408	172
1940-41	211	13.8	2,923	234	219	160
1941-42	224	17.6	3,947	322	301	163
1942-43	269	17.6	4,734	397	371	168
1943-44	257	20.9	5,388	432	404	160
1944-45	246	20.0	4,929	369	345	150
1945-46	234	21.9	5,128	370	346	144
1946-47	255	17.6	4,484	331	309	148
1947-48	259	15.1	3,917	297	277	152
1948-49	274	19.2	5,257	393	367	150
1949-50	279	17.9	4,984	414	387	166
1950-51	273	19.5	5,312	451	421	170
1951-52	258	17.3	4,463	295	276	132
1952-53	274	20.7	5,667	451	422	159
1953-54	280	20.6	5,759	479	448	166
1954-55	247	22.8	5,625	478	447	170
1955-56	232	24.4	5,664	454	425	161
1956-57	203	23.7	4,817	429	401	178
1957-58	226	22.0	4,976	396	370	159
1958-59	219	22.0	4,869	443	414	182
1959-60	250	20.3	5,073	440	411	174
1960-61	255	21.9	5,583	470	439	169
1961-62	277	25.7	7,118	650	607	183
1962-63	254	20.9	5,315	472	441	178
1963-64	296	28.9	8,554	759	710	177
1964-65	325	22.7	7,383	573	536	155
1965-66	288	22.7	6,542	550	514	168
1966-67	288	22.7	6,563	562	526	171
1967-68	294	27.6	8,110	740	692	182
1968-69	282	26.1	7,377	669	625	181
1969-70	235	24.1	5,676	537	502	189
1970-71	266	26.1	6,927	602	563	174
1971-72	301	21.4	6,438	571	534	177
1972-73	311	25.8	8,022	660	617	165
1973-74	319	20.6	6,570	558	522	170
1974-75	308	21.3	6,558	594	555	181
1975-76	308	21.0	6,468	640	598	198
1976-77	291	25.6	7,451	650	607	174
1977-78 ³	298	24.5	7,301	668	624	183

¹Production reported on raw value basis.

²Raw value multiplied by 0.9346.

³Estimate.

Source: 1939-40 to 1973-74—U.S. Department of Agriculture, Sugar Statistics and Related Data, Vol. 2, Statistical Bulletin No. 244.
1974-75 to 1977-78—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 3 (5), May 1978.

FLORIDA—SUGAR PRODUCTION—ACREAGE—YIELD

Crop Year	Sugarcane Used for Sugar			Sugar Produced		Raw Sugar 96° made per ton of sugarcane (Pounds) ¹
	Acreage harvested (1000 acres)	Average yield of cane per acre (Tons)	Production (1,000 tons)	(In thousands Raw Value Basis ¹	of short tons) Equivalent refined ²	
1939-40	20	35.5	714	70	65	197
1940-41	29	32.1	933	98	91	209
1941-42	31	30.7	944	94	88	198
1942-43	21	30.6	648	61	57	187
1943-44	27	25.7	699	65	60	185
1944-45	27	28.8	780	69	64	176
1945-46	31	33.2	1,041	100	93	192
1946-47	32	32.6	1,037	94	88	181
1947-48	35	26.7	921	80	75	173
1948-49	35	28.7	1,010	80	75	158
1949-50	37	30.8	1,126	105	98	186
1950-51	37	31.3	1,169	109	102	186
1951-52	39	32.4	1,260	122	114	195
1952-53	43	34.9	1,495	154	144	207
1953-54	45	32.6	1,453	151	141	207
1954-55	39	32.6	1,258	132	123	210
1955-56	35	33.4	1,160	118	110	204
1956-57	30	39.7	1,197	128	120	214
1957-58	33	41.7	1,358	135	126	201
1958-59	34	37.8	1,303	135	126	208
1959-60	46.4	38.2	1,771	175	164	198
1960-61	48.9	31.8	1,554	160	150	205
1961-62	56.2	36.2	2,036	208	194	204
1962-63	114.3	35.4	4,050	380	355	188
1963-64	142.5	31.2	4,446	424	396	191
1964-65	219.8	29.3	6,439	574	536	178
1965-66	185.4	29.1	5,505	554	518	201
1966-67	190.7	31.8	6,057	652	609	215
1967-68	190.6	34.3	6,542	717	670	219
1968-69	182.1	29.5	5,368	546	510	203
1969-70	153.4	33.8	5,197	535	500	205
1970-71	170.0	33.4	5,670	652	609	230
1971-72	189.9	31.7	6,022	635	593	211
1972-73	243.8	38.1	9,289	961	898	207
1973-74	257.6	31.5	8,119	824	770	203
1974-75	258.4	29.0	7,184	803	758	224
1975-76	286.6	35.3	10,264	1,061	992	207
1976-77	286.0	32.6	9,919	930	869	188
1977-78 ³	288.7	29.0	8,372	894	836	214

¹Production reported on raw value basis.

²Raw value multiplied by 0.9346.

³Estimate.

Source: 1939-40 to 1973-74—U.S. Department of Agriculture, Sugar Statistics and Related Data, Vol. 2, Statistical Bulletin No. 244.
1974-75 to 1977-78—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 3 (5), May 1978.

TEXAS—SUGAR PRODUCTION—ACREAGE—YIELD

Crop Year	Sugarcane Used for Sugar			Sugar Produced		Raw Sugar 96° made per ton of sugarcane (Pounds) ¹
	Acreage harvested (1000 acres)	Average yield of cane per acre (Tons)	Production (1,000 tons)	(In thousands Raw Value Basis ¹	of short tons) Equivalent refined ²	
1974-75	28.0	32.4	898	74	69	165
1975-76	35.0	35.3	1,236	126	118	204
1976-77	27.1	35.8	971	94	88	194
1977-78 ³	33.8	35.5	1,200	86	80	143

¹Production reported on raw value basis.

²Raw value multiplied by 0.9346.

³Estimate.

Source: U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 3 (5), May 1978.

PUERTO RICO—SUGAR PRODUCTION—ACREAGE—YIELD

Crop Year Ended	Sugarcane Used for Sugar			Sugar Produced		Raw Sugar 96° made per ton of sugarcane (Pounds) ¹
	Acreage harvested (1000 acres)	Average yield of cane per acre (Tons)	Production (1,000 tons)	(In thousands of short tons) Raw Value Basis ¹	Equivalent refined ²	
1945	288.6	27.7	7,994	971	908	242.9
1950	367.1	28.9	10,615	1,299	1,214	244.7
1955	361.1	27.3	9,873	1,166	1,090	236.2
1960	327.9	30.5	9,997	1,019	952	203.9
1962	308.6	31.3	9,663	1,008	942	208.8
1963	303.4	33.4	10,123	989	924	195.5
1964	303.1	32.3	9,802	989	924	201.9
1965	287.6	30.6	8,807	897	838	203.7
1966	272.8	34.7	9,465	883	825	186.7
1967	263.3	31.0	8,160	818	764	200.6
1968	237.1	27.8	6,590	645	603	195.9
1969	180.1	32.8	5,902	484	452	163.9
1970	188.8	31.2	5,891	460	430	156.2
1971	153.4	29.9	4,581	324	303	141.5
1972	152.4	28.7	4,382	298	278	135.7
1973	132.1	27.4	3,621	255	238	140.9
1974	121.6	29.5	3,585	291	272	162.4
1975	137.5	25.6	3,520	302	282	171.7
1976	123.9	29.3	3,630	312	291	172.0
1977 ³	116.2	27.3	3,177	318	297	200.2

¹Production reported on raw value basis.

²Raw value multiplied by 0.9346.

³Estimate.

Source: 1945-76: U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 2 (5), May 1977.

1977: USITC Publication 881, April 1978

**EDIBLE SYRUPS: UNITED STATES PRODUCTION, FOREIGN TRADE,
AND INDICATED DOMESTIC CONSUMPTION, 1950-1977**
(000 GALLONS)

Year	PRODUCTION ¹								IMPORTS				
	SYRUPS								Maple Syrup	Edible Molasses and Cane Syrup ³	Shipments from Territories Honey		
	Corn	Cane	Sorghum	Maple ²	Refiners	Edible Molasses	Honey	Total			Honey	Honey	Total
1950	130,448	9,745	3,539	2,006	4,005	3,314	19,780	172,837	479	2,214	1,020	30	3,743
1951	131,831	8,775	3,671	1,742	4,971	4,339	21,923	177,252	323	2,050	692	.....	3,065
1952	127,405	5,510	2,856	1,603	3,405	3,284	23,091	167,154	522	5,710	720	.....	6,952
1953	131,767	5,540	2,418	1,208	3,907	4,077	18,996	167,913	442	1,793	831	.....	3,066
1954	133,071	4,805	2,552	1,672	3,814	2,958	18,372	167,244	371	2,015	777	.....	3,163
1955	138,226	4,730	2,405	1,578	3,853	2,820	21,666	175,278	457	2,305	837	.....	3,599
1956	141,504	4,990	3,594	1,529	3,882	3,193	18,169	176,861	643	2,046	406	.....	3,095
1957	142,089	3,965	2,516	1,697	3,620	2,384	20,447	176,748	757	573	404	.....	1,734
1958	153,481	3,135	2,282	1,392	4,892	2,553	22,116	189,851	656	1,286	335	.....	2,277
1959	162,197	3,617	2,286	1,137	3,999	3,084	20,083	196,403	691	2,138	383	.....	3,212
1960	169,776	3,676	1,943	1,143	4,134	2,714	20,611	203,997	908	1,884	1,049	.....	3,841
1961	180,397	3,519	.....	1,524	3,846	3,379	21,721	214,386	904	911	768	.....	2,583
1962	201,259	3,303	.....	1,460	2,691	3,075	21,189	232,977	929	3,827	604	.....	5,360
1963	215,573	2,702	.....	1,143	2,769	2,772	22,647	247,606	1,068	1,706	221	.....	2,995
1964	238,832	2,814	.....	1,546	2,862	2,685	21,323	270,062	666	2,119	417	.....	3,202
1965	243,682	2,989	.....	1,266	2,994	2,648	20,427	274,006	879	3,349	1,127	.....	5,355
1966	252,337	2,923	.....	1,476	2,493	2,563	20,403	282,195	938	3,061	806	.....	4,805
1967	255,860	2,121	.....	979	2,402	2,477	18,225	282,064	1,147	1,065	1,416	.....	3,628
1968	274,000 ⁴	2,346	.....	983	2,561	2,466	16,165	298,521	988	3,732	1,427	.....	6,147
1969	282,000 ⁴	2,661	.....	1,032	2,235	2,532	22,591	313,051	1,185	2,266	1,244	.....	4,695
1970	292,000 ⁴	.....	.....	1,110	1,695	2,121	18,736	315,662	956	2,165	749	.....	3,870
1971	304,000 ⁴	.....	.....	962	1,883	2,517	16,674	326,036	577	2,470	967	.....	4,014
1972	387,880 ⁴	.....	.....	1,099	2,077	2,290	18,081	411,427	710	1,694	3,291	.....	5,695
1973	451,264	.....	.....	857	2,309	1,926	20,072	476,428	803	2,935	900	.....	4,638
1974	498,313	.....	.....	1,087	2,564	1,559	15,632	519,155	801	2,508	2,196	.....	5,505
1975	561,215	.....	.....	1,207	2,482	2,114	16,717	583,735	607	2,483	3,917	.....	7,007
1976	615,498	.....	.....	927	2,403	2,574	16,782	638,184	886	3,188	5,608	.....	9,682
1977 ⁵	695,196	.....	.....	1,221	2,197	2,538	14,891	716,043	867	1,938	5,396	.....	8,201

Year	<u>EXPORTS</u>				<u>INDICATED DOMESTIC CONSUMPTION</u>					
	Corn Syrup	Edible Molasses and Syrup including Maple ⁶	Honey	Total	<u>SYRUPS</u>					
					Cane Syrup, Refiners Syrup, and Edible Molasses					
					Corn	Maple	Sorghum		Honey	Total
1950	3,761	242	801	4,804	126,687	2,485	3,539	19,036	20,029	171,776
1951	4,287	231	1,075	5,593	127,544	2,065	3,671	19,904	21,540	174,724
1952	3,101	153	1,968	5,222	124,304	2,125	2,856	17,756	21,843	168,884
1953	3,241	267	2,789	6,297	128,526	1,650	2,418	15,050	17,038	164,682
1954	3,233	272	2,061	5,566	129,838	2,043	2,552	13,320	17,088	164,841
1955	3,386	248	1,739	5,373	134,840	2,035	2,405	13,460	20,764	173,504
1956	3,189	249	1,548	4,986	138,315	2,172	3,594	13,862	17,027	174,970
1957	2,745	250	1,681	4,676	139,344	2,454	2,516	10,292	19,200	173,806
1958	2,396	165	1,902	4,463	151,085	2,048	2,282	11,701	20,549	187,665
1959	2,245	155	1,062	3,462	159,952	1,828	2,286	12,683	19,404	196,153
1960	1,836	182	797	2,815	167,940	2,051	1,943	12,226	20,863	205,023
1961	1,370	173	607	2,150	179,027	2,428	.....	11,482	21,882	214,819
1962	1,514	140	1,158	2,812	199,745	2,389	.....	12,756	20,635	235,525
1963	2,055	192	2,125	4,372	213,518	2,211	.....	9,757	20,743	246,229
1964	1,632	205	760	2,597	237,200	2,212	.....	10,275	20,980	270,667
1965	1,003	.....	1,166	2,169	242,679	2,145	.....	11,980	20,388	277,192
1966	1,038	.....	1,219	2,257	251,299	2,414	.....	11,040	19,990	284,743
1967	1,113	.....	986	2,099	254,747	2,126	.....	8,065	18,655	283,593
1968	1,541	.....	684	2,225	272,459	1,971	.....	11,105	16,908	302,443
1969	2,169	.....	833	3,002	279,831	2,217	.....	9,694	23,002	314,744
1970	1,324	.....	688	2,012	290,676	2,066	.....	5,981	18,797	317,520
1971	1,324	.....	640	1,964	302,676	1,539	.....	6,870	17,001	328,086
1972	1,205	.....	346	1,551	386,675	1,809	.....	6,061	21,026	415,571
1973	1,377	.....	1,484	2,861	449,887	1,660	.....	7,170	19,488	478,205
1974	1,736	.....	386	2,122	496,577	1,888	.....	6,631	17,442	522,538
1975	1,070	.....	337	1,407	560,145	1,814	.....	7,079	20,297	589,335
1976	1,674	.....	396	2,070	613,824	1,813	.....	8,165	21,994	645,790
1977 ⁵	1,543	.....	466	2,009	693,653	2,088	.....	6,673	19,821	722,235

¹Production of cane syrup, sorghum syrup, and edible molasses is of the fall of the preceding year. Estimates of sorghum discontinued beginning 1961; cane syrup discontinued beginning 1969. ²Does not include varying quantities produced on nonfarm lands in Somerset County, Maine. ³U.S. Department of Commerce molasses and sugar syrups series, less liquid sugar imports reported to Sugar Division, Agricultural Stabilization and Conservation Service. ⁴Unofficial estimates. ⁵Preliminary. ⁶Assumed to be largely refiners' syrup. Beginning 1965, data not available because of change in export classification.

Source: U.S. Department of Agriculture, Economic Research Service. Data for 1949-58 in *Agricultural Statistics*, 1972, table 139. Data for 1959-76 in *Agricultural Statistics*, 1976, p. 94. Data for 1977, USITC Pub. 881 p.A-53, April 1978 and U.S. Department of Agriculture Crop Production Report, June 1978.

Part III

U.S. SUGAR LAWS

Laws governing sugar in the United States are as old as the country itself. Following is a brief review.

SUGAR'S TAXATION HISTORY

Sugar is one of the world's most regulated commodities. Approximately 85 percent of total world production comes under some type of internal or external law or regulation.

Sugar in the United States has been under government regulation since the American Revolution.

The first piece of general legislation enacted by the first U.S. Congress in 1789 was the first sugar tariff of the United States.

It provided for a duty of one cent per pound on brown sugars; three cents on loaf; and, one and one-half cents on all other types of sugars.

From that time on, sugar tariffs provided a major source of revenue until the imposition of Federal income and corporate taxes.

Accordingly, the rates had a tendency to fluctuate somewhat depending upon the condition of the national treasury.

Because the purity of present-day refined sugars was unknown in the early days of the Republic, complex tables of rates were required to assess the widely varying qualities of sugar which came into the U.S. from many parts of the world.

The Tariff Act of 1816 taxed loaf sugar at 12 cents per pound. There were other high tariffs during the Civil War period, after which tariff rates generally declined.

The Reciprocity Treaty, which became effective in 1876, between the Kingdom of Hawaii and the United States provided for free entry of Hawaiian Sugar. Annexation in 1898 made Hawaii a domestic producer.

For four years beginning in 1890, sugar was placed on the free lists, and a bounty to encourage production was paid to domestic producers. Louisiana growers benefited most from this as the beet sugar industry was just getting underway and Hawaii was not yet a part of the United States.

The Spanish American War, beginning in 1898, had a major influence on American sugar supplies.

Puerto Rico in 1900 was given a preferential reduction in tariff charges. A year later, her sugar was placed on the free list.

The Philippines in 1902 received a 25 percent preferential tariff reduction. In 1909, she was permitted free entry on the first 300,000 tons of sugar exported to the U.S. In 1914, all of her sugar sales to the U.S. were placed on the free list.

Cuba in 1903 received a preferential tariff reduction of 20 percent below the full world tariff rate. Up to the early 1960's Cuba retained a preferred tariff position among foreign suppliers of the American market. Cuba was considered America's sugar warehouse.

Diplomatic relations between Cuba and the U.S. were severed in 1961 and its quota was allocated to other suppliers on a formula basis established by Congress.

The Philippines, granted independence by the United States in 1946, stayed on the free list until December 31, 1955.

Excluding those areas which have received preferential treatment, the tariff duty paid by other suppliers of the U.S. market has been changed 11 times over the years since 1897 when it was set at 1.685 cents per pound.

The tariff varied at different times until 1951 when it was set at 0.625 cents per pound. This tariff prevailed until September 21, 1976 when, in response to pleas from representatives of sugar producing states throughout the U.S., President Gerald R. Ford increased it to 1.875 cents per pound.

In response to legislation, which will be discussed later, President Carter on November 12, 1977 increased the duty on raw sugar to 2.8125 cents per pound and also established an import fee of 3.32 cents per pound. This action made no distinction between raw sugar and refined sugar and so, in January 1978, fixed import fees of 2.7 cents per pound for raw sugar and 3.22 cents per pound for refined sugar were established. The tariff remained where it had been set in 1977.

MODERN U.S. SUGAR LEGISLATION

The Depression of 1929 drove home the point that tariffs alone could not be the sole tool to regulate U.S. sugar supplies. In 1934, the Jones-Costigan Act amended the Agricultural Adjustment Act to include sugar as a basic commodity under the general farm program.

It provided for a processing tax on refined sugar, for benefit payments to sugarbeet and sugarcane growers under production adjustment contracts, and for quotas for domestic and foreign areas supplying the U.S. market.

The Supreme Court in 1936 declared the benefit payments and taxes on sugar unconstitutional, but quotas were not questioned and continued in effect.

The Sugar Act of 1937, which embodied the basic principles of the Jones-Costigan Act, was signed into law September 1 of that year and continued in effect until succeeded by the Sugar Act of 1948. However, the quota system was suspended for several years during the 1940's because of World War II.

The Sugar Act of 1948 was extended seven times with various amendments. The seventh extension was signed by President Richard M. Nixon in October 1971. The Act was terminated December 31, 1974.

U.S. SUGAR ACT

The United States Sugar Act, generally called the Sugar Act of 1948, as amended, was a federal law designed to achieve three major goals:

1. To assure consumers of adequate supplies of sugar at reasonable prices.

CONTINENTAL U.S. SUGAR CONSUMPTION* AND POPULATION

Five Year Intervals—1873-1928

Year	Total Sugar Consumption* (Short tons, raw value)	Population** (000's)	Per Capita Consumption (Pounds, refined value)
1873 ...	897,072	41,677	40.23
1878 ...	926,929	47,598	36.40
1883 ...	1,402,577	53,693	48.83
1888 ...	1,746,385	59,974	54.43
1893 ...	2,283,985	66,970	63.75
1898 ...	2,400,278	73,494	61.05
1903 ...	3,055,492	80,983	70.52
1908 ...	3,817,849	89,073	80.11
1913 ...	4,485,778	96,512	86.88
1918 ...	4,189,134	103,588	75.59
1923 ...	5,729,172	111,537	96.01
1928 ...	6,658,400	119,862	103.83

Yearly Intervals—1931-1977

1931 ...	6,702,080	124,039	100.99
1932 ...	6,438,880	124,840	96.40
1933 ...	6,387,041	125,579	95.07
1934 ...	6,331,585	126,374	93.64
1935 ...	6,633,928	127,250	97.44
1936 ...	6,706,195	128,053	97.89
1937 ...	6,671,402	128,825	96.79
1938 ...	6,643,253	129,825	95.64
1939 ...	6,867,518	130,880	98.08
1940 ...	6,890,668	132,122	97.49
1941 ¹ ...	8,069,457	133,402	113.06 ¹
1942 ...	5,466,204	134,860	75.76
1943 ...	6,334,713	136,739	86.59
1944 ...	7,147,350	138,397	96.53
1945 ...	6,040,569	139,928	80.69

*Theoretical consumption. (Actually deliveries for consumption, and includes deliveries for U.S. military forces at home and abroad.)

**Includes Alaska, excludes Hawaii.

Source: Lamborn Sugar Market Report, Feb. 28, 1978.

Year	Total Sugar Consumption* (Short tons, raw value)	Population** (000's)	Per Capita Consumption (Pounds, refined value)
1946 ...	5,620,708	141,389	74.31
1947 ...	7,447,834	144,126	96.59
1948 ...	7,342,971	146,631	93.61
1949 ...	7,580,225	149,188	94.97
1950 ...	8,279,330	151,683	102.02
1951 ...	7,736,573	154,360	93.68
1952 ...	8,104,160	157,028	96.47
1953 ...	8,484,900	159,636	99.35
1954 ...	8,206,606	162,417	94.44
1955 ...	8,399,081	165,270	94.99
1956 ...	8,903,877	168,176	98.96
1957 ...	8,733,988	171,198	95.36
1958 ...	9,030,271	174,060	96.97
1959 ...	9,181,146	177,261	96.81
1960 ...	9,260,833	180,085	96.12
1961 ...	9,610,929	183,093	98.11
1962 ...	9,751,927	185,933	98.04
1963 ...	9,988,831	188,619	98.99
1964 ...	9,670,693	191,262	94.51
1965 ...	10,020,287	193,653	96.72
1966 ...	10,299,344	195,904	98.27
1967 ...	10,245,342	198,045	96.70
1968 ...	10,927,340	200,029	102.11
1969 ...	10,654,760	201,975	98.61
1970 ...	11,309,516	204,158	103.54
1971 ...	11,288,057	206,313	102.27
1972 ...	11,415,469	208,082	102.54
1973 ...	11,482,298	209,627	102.38
1974 ...	11,237,140	211,097	99.50
1975 ...	9,974,144	212,730	87.64
1976 ...	10,856,113	214,311	94.68
1977 ² ...	11,187,464	215,975	96.82

¹During 1941, a large quantity of the deliveries went into the building up of the "invisible" supply, and was not consumed during that year. In 1942, the major portion of this invisible supply was recaptured by the OPA and reallocated for consumption during 1942.

²Preliminary.

2. To maintain the domestic sugar industry.
3. To promote the export trade of the United States.

It was also designed to be self-supporting.

To a remarkable degree it achieved those goals.

After 1934 when the law went into force, abundant supplies of sugar were available to American consumers at fair and reasonable prices. A vigorous sugar industry was developed within our national borders.

There were social gains too, in the improvement of wages and working conditions of farm laborers.

The program also put more than \$660 million into the U.S. Treasury above its costs.

HOW THE SUGAR ACT WORKED

The Act directed the Secretary of Agriculture in October of each year to estimate the consumption

of sugar in the U.S. for the year ahead.

Once he had arrived at an estimate, the total amount of sugar it represented was allocated among domestic and foreign sources of supply by a formula set down in the Act. These allocations were quotas—the amount of sugar each area was permitted to market in the United States in the ensuing year.

Roughly 40 percent of the total was assigned to 34 foreign countries, 21 of them in the Western Hemisphere.

If, as the year advanced, it appeared that the Secretary of Agriculture's estimate of consumption was too high or too low, he was required to revise the estimate to meet the changed conditions. In the event that any area—domestic or foreign—was unable to fill its quota, the Secretary reallocated the deficit to fill the void and thus maintain an even flow of sugar to consumers.

Deficits in domestic areas were reallocated to foreign countries.

END OF THE SUGAR ACT

The U.S. House of Representatives on June 5, 1974, by a vote of 209 to 175, rejected a bill which would have extended the 40-year-old U.S. Sugar Act through 1979.

The end of the Sugar Act on December 31, 1974 placed domestic U.S. sugar producers in direct competition with producers in the "World Sugar Market." The U.S. is the only major sugar-producing and also sugar-importing country that has no effective government regulation of the production and importation of sugar.

ADMINISTRATIVE AND LEGISLATIVE ACTIONS ON SUGAR—1977-1978

Action taken by President Ford in the fall of 1976 was not effective in stemming sugar imports or in halting the decline in raw sugar prices. Domestic sugar producers continued to press for relief and, on May 4, 1977, President Jimmy Carter announced an administrative sugar program under existing statutory authority. Domestic producers of sugar from sugar beets and sugarcane were to be paid the difference between the actual costs of producing raw sugar and a target support price of 13.5 cents per pound. Processors were to pass through these benefit payments to the growers of sugarcane and sugar beets. Actual cost of producing sugar from beets and cane was to be determined by averaging

costs of all producers in the United States.

At the time he announced his program, President Carter called it an "interim program" because he was confident that an International Sugar Agreement would result from the negotiations then going on in Geneva. (See page 34 for discussion of the International Sugar Agreement.)

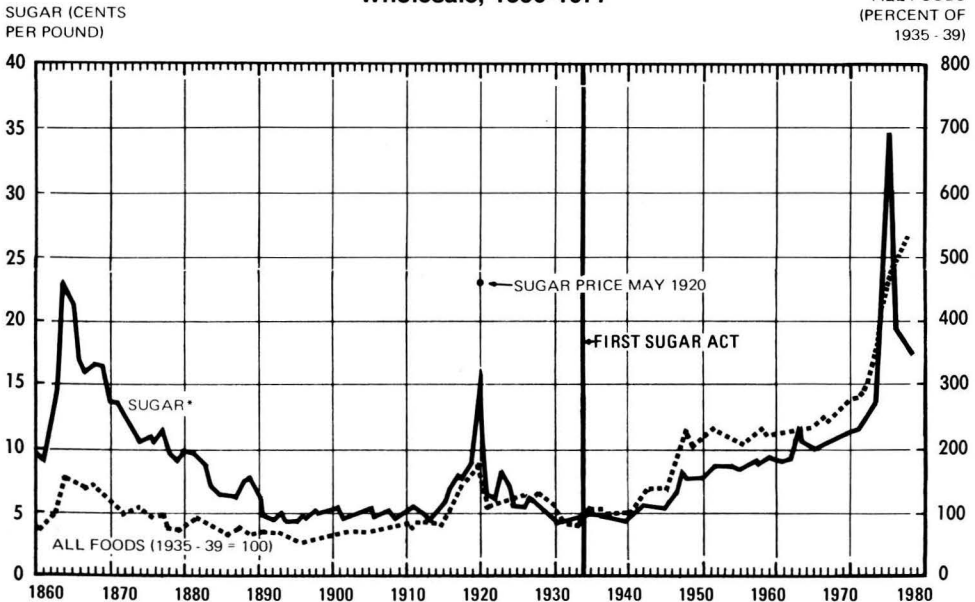
By August 1977 both Houses of Congress approved the de la Garza amendment to the Agriculture Act of 1977. This amendment made sugar produced from sugarcane and sugar beets in the United States eligible, along with other commodities, for price support under loan and purchase programs.

In its report on the bill, the House-Senate Conference Committee noted that, with respect to sugar, it did not anticipate any loans or purchases would be made because it was the Congressional intent that a price that would assure returns equal to at least the cost of production would be obtained by other means. The means the Congress had in mind were the control of imports, presumably by use of existing authority to establish import quotas, higher tariffs and import fees.

On September 29, 1977, when the President signed the Food and Agriculture Act of 1977, the interim program announced by the President in May terminated, except that sugar produced prior to that date and committed for sale would still be eligible for support payments.

Support payments totaling approximately \$162 million have been paid to domestic producers of

Refined Sugar Prices, and Index of All Food Prices At Wholesale, 1860-1977



Source: 1860-1976—All food prices—U.S. Dept. of Labor.
All sugar prices—U.S. Dept. of Agriculture.
1977—USDA, Economic Statistics and Cooperatives Service.

sugar. Some additional payments under that program are still due, and so the total final amount is not known.

In carrying out the intent of Congress, the President, on November 12, increased by proclamation the tariff on imported sugar to 2.8125 cents per pound (96° basis) and established an import fee of 3.32 cents per pound. No differential was provided between raw sugar and refined sugar and so, subsequently, on January 20, 1978 a new proclamation was issued providing for a fixed import fee of 2.7

cents per pound for raw and 3.22 cents per pound for refined sugar.

None of the actions described above have been effective in increasing the market price of sugar in the United States to a level adequate to cover costs of production of domestic producers. Accordingly, as of the time of this writing (May 1978), the Congress is again considering sugar legislation that would stabilize the U.S. market by a supply management program comparable in some ways to the Sugar Act which expired in 1974.

TOTAL FOREIGN IMPORTS INTO U.S.A. (Mainland) BY COUNTRIES OF ORIGIN: 1974 THROUGH 1977

Source of Supply	1974	1975	1976	1977
OFFSHORE				
(Short Tons, Raw Value)				
FOREIGN				
Argentina	109,755	112,318	86,729	267,177
Australia	241,705	479,172	469,528	493,620
Austria	10	.....	16	.....
Belgium	2	.....	717	1,690
Belize	62,506	46,155	14,350	31,129
Bolivia	5,714	3,507	52,990	49,473
Brazil	783,330	197,131	.....	660,427
Canada	1	39,990	49,457	138,027
China, Republic of	90,059	139,963	86,534	86,035
Colombia	104,820	159,065	84,289	14,249
Costa Rica	78,515	56,240	65,076	95,365
Denmark .....	.....	2	.....	3,099
Dominican Republic	817,728	775,147	971,084	975,056
Ecuador	59,628	46,770	28,441	55,380
El Salvador	65,127	107,466	143,154	166,028
Fiji Islands	46,083	1	.....	18,407
France .....	.....	.....	14,275	27,215
Germany, West	5	1	904	19,906
Guatemala	95,934	60,606	330,578	300,938
Haiti	18,807	11,622	6,218	.....
Honduras	8,455	6,073	7,483	25,054
India	84,902	187,624	188,545	32
Korea .....	.....	10,615	940	288
Malagasy Republic	13,088	13,022	13,400	12,052
Malawi	10,274	26,585	17,659	38,358
Mauritius	45,527	26,741	29,811	57,363
Mexico	538,131	41,130	543	274
Mozambique .....	.....	15,090	31,847	97,311
Netherlands .....	.....	22	1,538	.....
Netherlands Antilles .....	.....	1,296	.....	.....
Nicaragua	53,254	57,962	165,710	119,760
Panama	65,525	98,250	95,031	131,162
Paraguay	8,506	3,328	10,187	.....
Peru	471,145	215,679	312,726	312,794
Philippines	1,472,299	413,034	913,781	1,443,131
South Africa	69,410	134,082	98,472	274,227
Swaziland	41,360	35,795	45,923	61,643
Sweden	4	3	2	2
Switzerland .....	.....	.....	745	.....
Thailand	26,220	123,512	70,059	.....
United Kingdom .....	.....	29	84	44
Uruguay .....	.....	.....	5,229	.....
Venezuela .....	.....	24	.....	.....
West Indies	282,146	237,537	243,978	159,745
Total Foreign	5,769,975	3,882,589	4,658,039	6,136,482

Source: U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 3 (3), March 1978.

Part IV

WORLD SUGAR

Sugar, a basic food obtained mainly from sugarcane and sugar beets, is produced in some 125 nations throughout the world.

Total centrifugal sugar production for the 1977-78 crop year is estimated to be 100 million short tons. Of this, approximately 40% was from sugar beets and 60% was from sugarcane. An additional 12 million short tons of non-centrifugal sugar was produced. Non-centrifugal sugar ordinarily is not traded because it is consumed in areas near where it is produced.

It is estimated that total world centrifugal sugar consumption for 1977-78 will be 94.5 million tons. About 75% of this will be used in the countries where the sugarcane or sugar beets were grown and the sugar produced. The other 25% is traded to countries that either produce no sugar or require more than they produce. Some of this sugar trade is under bilateral agreements, some of them of relatively long duration.

Sugar not exported and imported under such agreements constitutes a so-called "world market." Prices in the world market are normally lower than those obtained under long-term agreements and frequently are below the cost of production, even in the most efficient producing areas. The world market represents a dumping ground for sugar that is not needed for domestic use or to meet export commitments. The price, therefore, of this sugar during 1977 has been extraordinarily low compared to costs of production.

INTERNATIONAL SUGAR AGREEMENT

A series of meetings in 1976 and 1977 by representatives to the International Sugar Organization culminated in an International Sugar Agreement on October 7, 1977. The new Agreement became provisionally effective on January 1, 1978.

The objective of the Agreement is to so regulate exports of sugar to the world market that prices will be maintained within a specified corridor. The regulation of exports is to be achieved through quotas applied to basic export tonnages assigned to each exporting country. The mechanism provided in the Agreement is to reduce basic export tonnages by 15% when the world price is less than 11 cents. Sugar retained under this quota provision would enter a reserve stock which would be released only when the world price exceeded 19 cents.

There are a great many detailed provisions in the Agreement providing for the administration of the program, providing special quotas for designated producing areas, for financing the stocks to be held in reserve and for import-export fees.

A total of 87 countries—53 exporters and 34 importers—were allocated votes in the International Sugar Agreement. A sufficient number of countries holding votes had approved the Agreement for it to begin operating provisionally January 1, 1978. Many governments, including the United States, must ratify participation. Legislation has been introduced into the U.S. Congress for ratification and is under consideration at this writing. A number of other countries must complete ratification in order for the Agreement to come into full force and effect.

Free market stocks had accumulated to such an extent that the International Sugar Agreement has had no effect to date on the world price and general opinion is that it will not be effective until it has been in operation for at least 12-18 months.

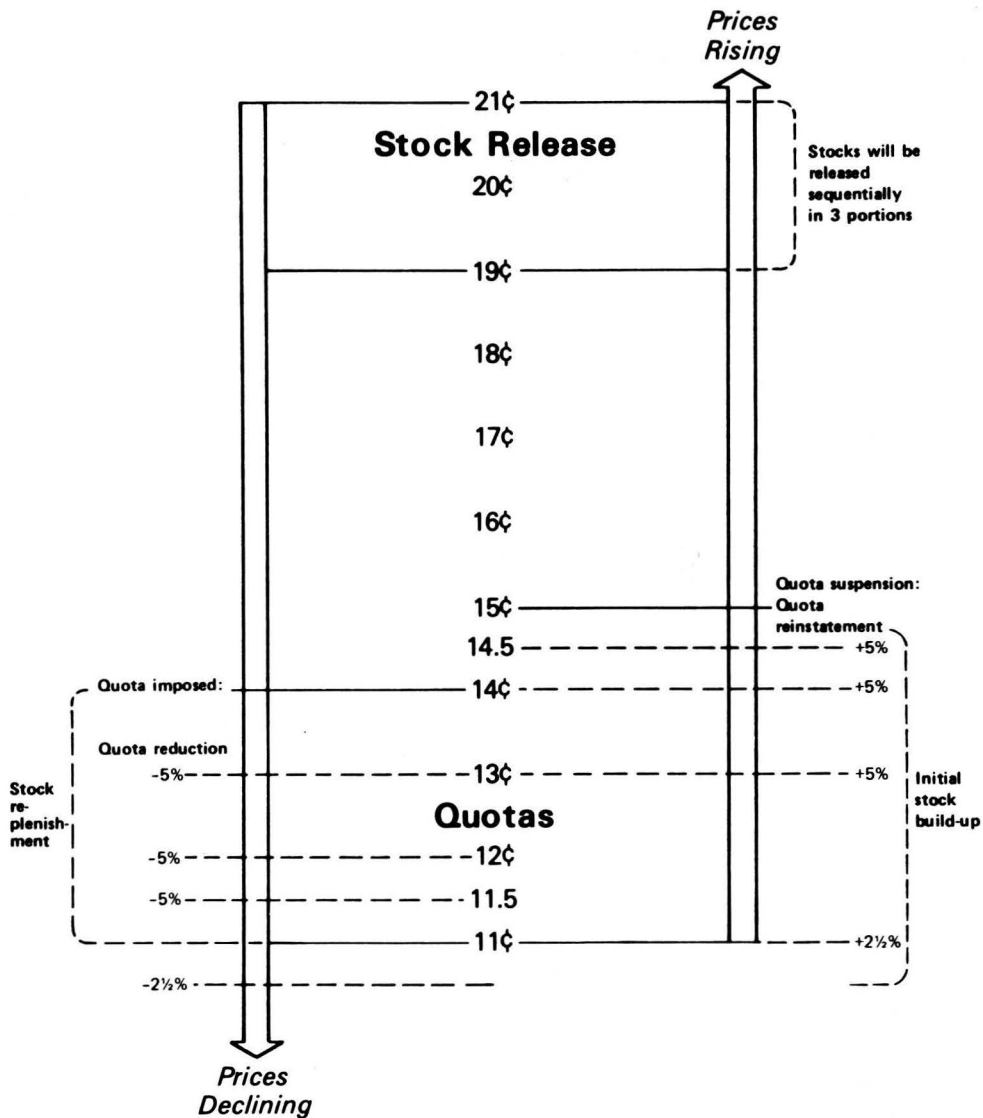
The procedure for determining the International Sugar Agreement daily sugar price includes the use of the spot price under the New York Coffee and Sugar Exchange sugar Contract No. 11 as well as the London sugar market daily price for Contract No. 12. Some problems were introduced in this as well as in some other areas when on November 3, 1977 the reporting of daily spot raw sugar prices by the New York Coffee and Sugar Exchange was suspended. This suspension was the result of United States Department of Justice charges of violations of the antitrust laws.

For purposes of administering the International Sugar Agreement, as well as to meet certain other needs, efforts are being made to find an alternative to the discontinued New York spot price.

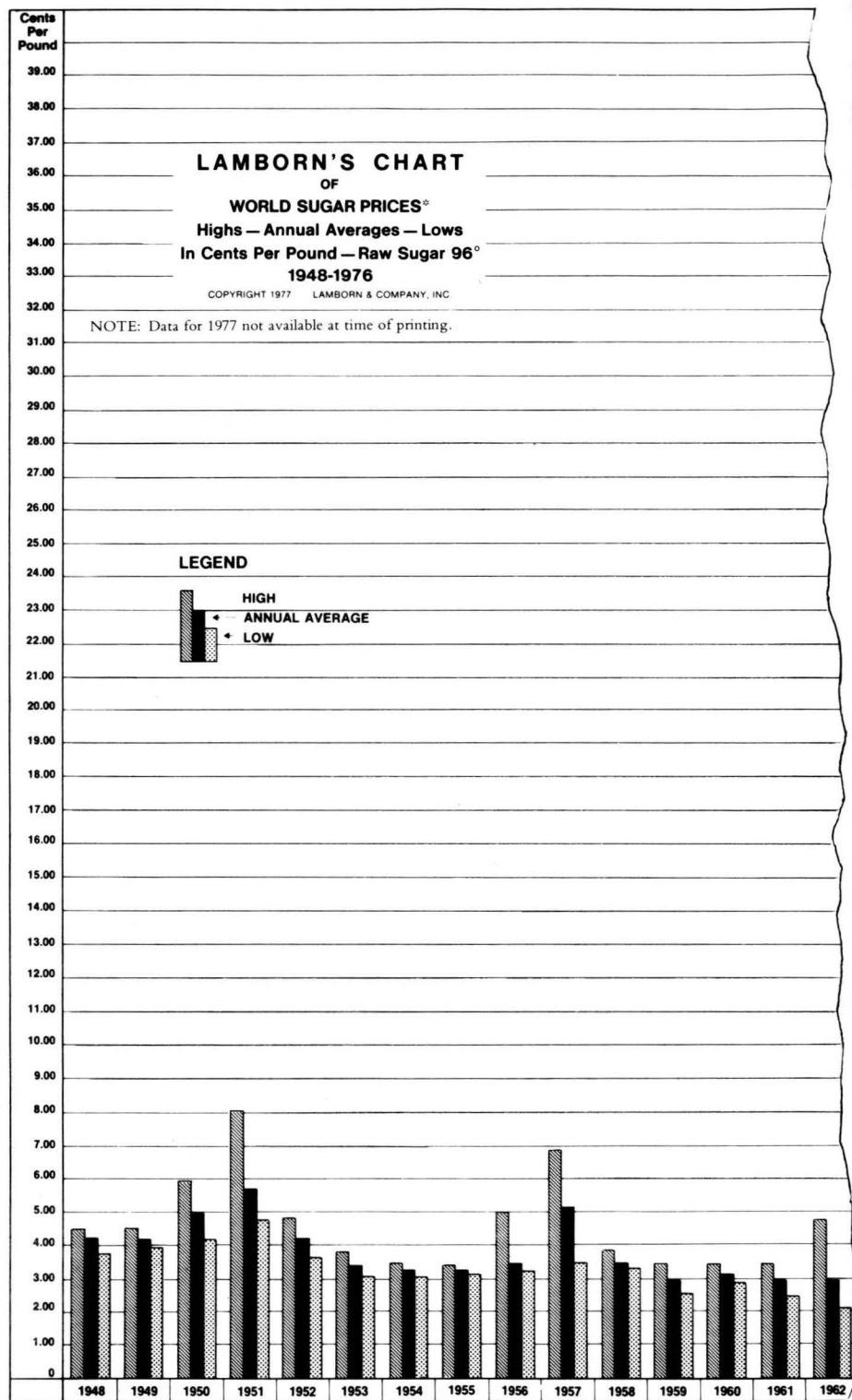
One suggestion has been to determine the prevailing differentials between the sugar futures market and actual transactions in the cash market. Another suggestion is to start with the price of refined sugar as reported by the International Sugar Agreement and subtract the refiners' margin and refining loss in order to arrive at an equivalent raw sugar price. It has also been noted that there was a close and consistent relationship between the New York spot price and the London daily price.

INTERNATIONAL SUGAR AGREEMENT

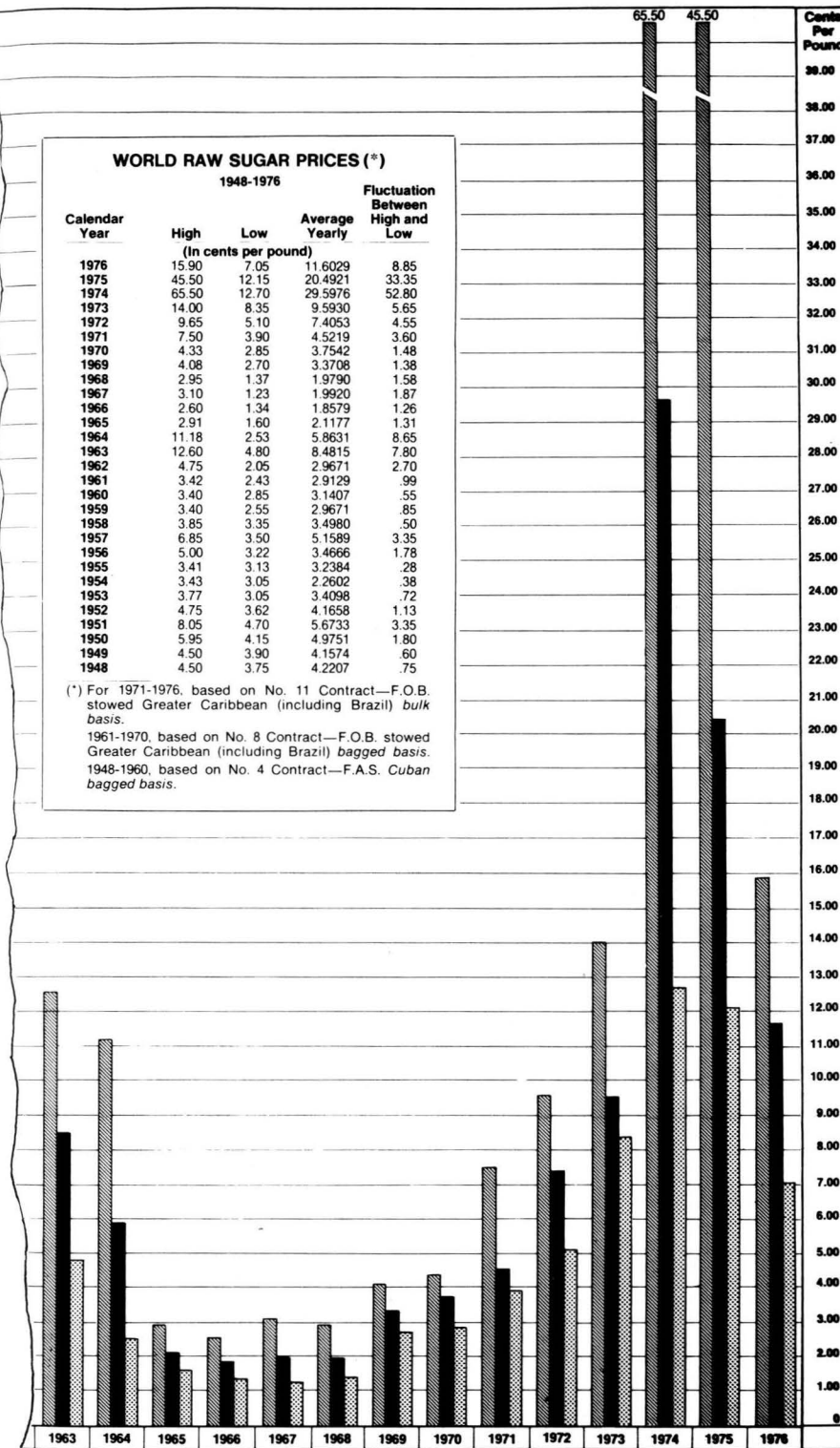
PRICE STABILIZATION MECHANISM



Source: U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 3 (5) May 1978.



★ ★ ★ ★ LAMBORN'S COMPLETE SUGAR



BROKERAGE SERVICE ★ ★ ★ ★

WORLD CENTRIFUGAL SUGAR PRODUCTION IN SPECIFIED

Region and Country	1973	1974	1975	1976	1977 ²
	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons
NORTH AMERICA:					
United States:					
Mainland cane	1,381	1,470	1,827	1,670	1,543
Hawaii	1,040	1,107	1,050	1,100	1,102
Puerto Rico	290	299	308	272	248
Total U.S. cane	2,711	2,876	3,185	3,042	2,894
Sugar beets	3,217	2,915	4,019	3,882	3,307
Total U.S.	5,928	5,791	7,204	6,924	6,201
Caribbean:					
Cuba	6,393	6,944	6,834	6,393	6,614
Dominican Republic	1,316	1,251	1,377	1,500	1,543
Other countries	973	896	963	874	940
Total Caribbean	8,682	9,091	9,174	8,767	9,097
Other Mainland:					
Mexico	3,092	2,972	2,974	2,973	3,175
Canada	126	103	155	182	130
Central America	1,269	1,439	1,660	1,853	2,025
Total Other Mainland	4,487	4,514	4,789	5,008	5,330
Total North America ³	19,098	19,397	21,167	20,699	20,628
SOUTH AMERICA:					
Argentina	1,819	1,689	1,487	1,722	1,764
Brazil	7,671	8,157	6,834	8,267	9,480
Colombia	937	1,001	1,064	972	959
Peru	1,124	1,091	1,054	1,014	1,058
Venezuela	580	584	509	488	551
Other countries	1,116	1,323	1,602	1,592	1,602
Total South America ³	13,247	13,845	12,550	14,055	15,414
EUROPE:					
Western Europe:					
E.C.-9⁴					
Belgium-Luxemburg ..	865	683	797	826	832
Denmark	405	457	465	458	569
France	3,588	3,250	3,570	3,272	4,313
Germany, Fed. Rep. of	2,756	2,687	2,800	3,014	3,020
Ireland	208	158	219	208	215
Italy	1,274	1,113	1,546	1,929	1,312
Netherlands	917	856	1,008	1,042	898
United Kingdom	1,154	681	766	852	1,102
Total E.C.-9 ³	11,167	9,885	11,171	11,601	12,261
Non E.C.					
Austria	408	438	564	431	441
Greece	177	206	338	424	386
Spain	886	659	1,030	1,593	1,439
Sweden	291	336	305	333	375
Other countries	216	190	183	218	261
Total Non E.C. ³	1,978	1,829	2,420	2,999	2,902
Total Western Europe ³	13,145	11,714	13,591	14,600	15,163

COUNTRIES, RAW VALUE, 1973/74 TO 1977/78

Region and country	1973	1974	1975	1976	1977 ²
	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons
Eastern Europe:					
Czechoslovakia	893	937	827	772	937
German Democratic Rep.	777	772	716	661	716
Poland	2,003	1,716	2,149	2,205	2,425
Romania	698	618	617	882	799
Yugoslavia	532	611	539	779	790
Other countries	674	656	685	779	839
Total Eastern Europe ³	5,577	5,310	5,533	6,078	6,506
Total Europe ³	18,722	17,024	19,124	20,678	21,669
U.S.S.R.	10,546	8,521	8,488	8,102	10,251
AFRICA:					
Egypt	715	595	683	731	733
Mauritius	768	767	547	806	788
Mozambique	430	441	268	386	386
South Africa	1,908	2,076	1,986	2,251	2,315
Other countries	2,282	2,046	2,566	2,719	2,896
Total Africa ³	6,103	6,285	6,050	6,893	7,118
ASIA:					
China-Peoples Republic .	2,899	2,646	2,811	2,866	3,031
China-Rep. of Taiwan ..	983	828	901	1,238	1,102
India	5,455	6,387	6,023	6,658	6,614
Indonesia	1,047	1,102	1,157	1,268	1,323
Iran	728	711	755	816	802
Japan	720	527	519	623	633
Pakistan	701	614	694	811	821
Philippines	2,913	2,717	3,236	2,949	2,535
Thailand	1,025	1,168	1,809	2,492	1,984
Turkey	918	919	1,087	1,416	1,323
Other countries	370	476	489	552	603
Total Asia ³	17,759	18,095	19,482	21,689	20,771
OCEANIA:					
Australia	2,857	3,226	3,294	3,753	3,748
Fiji Islands	386	301	300	323	331
Total Oceania ³	3,243	3,527	3,594	4,076	4,079
TOTAL WORLD	88,718	86,694	90,455	96,192	99,930

¹Crop years are on a September/August basis, but include the output of sugar from harvests of several Southern Hemisphere countries which begin prior to September.

²Estimate.

³May not add due to rounding.

⁴E.C. Economic Community.

Source: 1972-1975—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 2 (2), February 1977.
1976-1977—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 3 (2) February 1978.

NON-CENTRIFUGAL SUGAR:¹
Production in Specified Countries, Annual 1973/74-1977/78²
(IN THOUSANDS OF SHORT TONS)

Region and Country	1973-74	1974-75	1975-76	1976-77	1977-78 ³
NORTH AMERICA:					
Costa Rica	46	41	44	50	50
El Salvador	11	18	18	18	11
Guatemala	60	57	60	93	50
Mexico	127	72	72	72	72
Nicaragua	15	13	11	11	11
Panama	7	2	3	2	3
TOTAL	266	203	208	246	197
SOUTH AMERICA:					
Brazil	309	220	220	220	220
Colombia	772	614	757	947	903
Ecuador	45	44	44	46	50
Peru	14	14	14	15	15
Venezuela	28	44	42	43	44
TOTAL	1,168	936	1,077	1,271	1,232
ASIA:					
Burma	157	143	149	152	154
China, Peoples Rep.	882	898	904	909	915
China, Rep. of (Taiwan) ..	30	30	30	33	46
India	7,192	6,724	6,834	6,834	6,944
Indonesia	165	193	220	220	248
Japan	15	11	13	13	11
Nansei-Nanpo (Ryukyo) ⁴ ..	.....	.....	.....	.....	.....
Pakistan	1,764	1,483	1,593	1,598	1,598
Philippines	66	60	60	56	57
Thailand	332	386	408	772	772
Vietnam South	11	12	11	11	12
TOTAL	10,614	9,940	10,222	10,599	10,757
WORLD TOTAL	12,048	11,079	11,507	12,117	12,186

NOTE: Due to rounding, may not add to area total.

¹Noncentrifugal sugar includes all types of sugar produced by other than centrifugal process which is largely for consumption in the relatively few areas where produced. The estimates include such kinds known as piloncillo, panela, papelón, chancaca, radura, jaggery, gur, muscovado, panocha, etc.

²Years shown are last year's crop-harvesting season. For chronological arrangements here all campaigns which begin not earlier than September of one year nor later than August of the following year, are placed in the same crop-harvesting year. The entire season's production of each country is credited to the September/August year in which harvesting and sugar production began.

³Preliminary.

⁴Since January 1, 1972, included in Japan.

Source: USDA Foreign Agricultural Service, Circular FS4-77, Dec. 1977. Prepared or estimated on the basis of official statistics of foreign governments, other foreign source materials, reports of U.S. Agricultural Attaches and Foreign Service Officers, results of office research and related information.

PRICES OF WHITE REFINED SUGAR IN SELECTED COUNTRIES

Representative Prices for Years 1974-1976 (U.S. Cents per Pound)

Note: Data for 1977 not available at time of printing

Countries	Locality	Representative Prices					
		1974		1975		1976	
		Wholesale	Retail	Wholesale	Retail	Wholesale	Retail
<u>NORTH AMERICA</u>							
Canada	Montreal	39.8	41.5	29.1	37.0	19.2	24.1
U.S.A.	whole country	32.3	34.4	.....	.....	19.2	24.0
<u>CENTRAL AMERICA</u>							
Belize	Belize	6.8	7.7	5.7	6.5	5.8	6.5
El Salvador	whole country	9.1	10.0	9.1	10.0	14.0	16.0
Guatemala	whole country	7.0	8.0	9.5	11.0	9.5	11.0
Jamaica	whole country	13.0	13.3	14.6	15.3	N.A.	N.A.
Trinidad & Tobago	whole country	12.0	12.5	10.0	.....	N.A.	N.A.
West Indies:							
Barbados	whole country	48.5	60.5	.....	.....	N.A.	N.A.
Leeward Islands:							
St. Kitts-Nevis	whole country	.....	.....	38.0	51.0	N.A.	N.A.
Dominican Republic	whole country	.....	.....	.....	.....	14.8	17.0
Panama	.....	.....	.....	.....	.....	17.9	20.0
<u>SOUTH AMERICA</u>							
Argentina	.....	20.0	22.1	.....	.....	N.A.	N.A.
Bolivia	whole country	15.0	15.5	15.0	15.5	N.A.	N.A.
Brazil	Rio de Janeiro	9.1	9.5	10.8	11.3	13.5	14.0
Chile	Santiago	27.0	28.0	.....	.....	N.A.	N.A.
Colombia	whole country	.....	.....	5.5	7.5	N.A.	N.A.
Ecuador	.....	.....	.....	6.0	6.7	N.A.	N.A.
Guyana	whole country	40.1	43.3	34.5	37.5	N.A.	N.A.
Peru	whole country	6.3	6.6	5.5	5.8	7.8	8.3
Venezuela	whole country	12.2	13.1	.....	.....	N.A.	N.A.
<u>ASIA</u>							
Bangladesh	whole country	27.2	27.7	20.1	20.7	N.A.	N.A.
Hong Kong	whole country	32.6	44.9	.....	.....	N.A.	N.A.
India	Kanpur	11.8	11.9	10.6	10.7	11.0	11.1
Iraq	whole country	.....	.....	.....	.....	19.2	20.1
Israel	whole country	.....	.....	.....	.....	20.0	25.0
Japan	Tokyo	26.9	34.7	38.9	44.7	31.8	40.8
Jordan	Amman	.....	22.2	.....	80.0	20.6	21.2
Korea, Rep. of	Seoul	36.0 ¹	40.0 ¹	47.0	50.0	43.4	45.8
Kuwait	whole country	14.1	15.5	.....	.....	N.A.	N.A.
Philippines	Manila	7.6	9.1	9.3	10.6	9.4	10.7
Saudi Arabia	whole country	.....	.....	16.5	19.4	N.A.	N.A.
Singapore	whole country	13.9	14.8	19.1	19.7	22.1	22.8
Sri Lanka	whole country	.....	.....	.....	84.0	N.A.	N.A.
Syria	whole country	.....	.....	35.7	36.8	33.8	34.5
Thailand	Bangkok	9.6 ¹	10.3 ¹	9.6	10.3	11.7	13.0
<u>EUROPE</u>							
Austria	whole country	11.8	13.7	13.7	16.1	13.8	16.1
Cyprus	whole country	31.7	36.5	.....	.....	.....	.....
Finland	whole country	28.7	36.6	35.7	45.5	45.1	57.4
German Dem. Rep.	whole country	14.4	15.5	14.4	15.5	N.A.	N.A.
Greece	Athens	24.3	30.7	23.8	27.1
Hungary	whole country	67.6	75.1	N.A.	N.A.
Norway	Oslo	50.7	56.4

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PRICES OF WHITE REFINED SUGAR IN SELECTED COUNTRIES

Representative Prices for Years 1974-1976 (U.S. Cents per Pound)

Note: Data for 1977 not available at time of printing

Representative Prices

Countries	Locality	1974		1975		1976	
		Wholesale	Retail	Wholesale	Retail	Wholesale	Retail
<u>EUROPE (continued)</u>							
Portugal	whole country	.....	.....	14.9	16.4	20.0	23.0
Sweden	whole country	21.9	29.8	22.4	32.7	21.3	33.3
Switzerland	whole country	.....	.....	34.5	44.0	N.A.	N.A.
Turkey	Ankara	16.0	18.8	21.3	23.3	20.1	N.A.
Yugoslavia	.....	.....	.....	.....	.....	30.0	33.0
<u>AFRICA</u>							
Burundi	.....	.....	.....	119.4	127.0	38.0 ¹	45.6 ¹
Ethiopia	whole country	15.0	16.0	.....	.....	32.6	36.0
Ghana	.....	17.3	19.4	115.1 ¹	123.7 ¹	N.A.	N.A.
Malagasy Rep.	Tananarive	11.0	14.4	11.2	14.7	10.7	13.0
Malawi	whole country	.....	.....	7.0	11.3	7.0	11.3
Mauritius	whole country	4.0	5.0	4.0	5.0	4.0	5.0
Somalia	whole country	30.8	32.8	.....	.....	N.A.	N.A.
South Africa	Durban	12.5	14.0	12.5	14.0	11.0	12.1
Swaziland	whole country	9.4	14.1	6.4	9.8	6.4	9.8
Tunisia	whole country	17.2	17.7	.....	.....	N.A.	N.A.
<u>OCEANIA</u>							
Australia	major cities	11.5	13.5	12.5	15.0	13.0	16.0
Fiji	main centers	6.3	8.8	8.6	11.0	9.8	11.4
New Zealand	4 main cities	12.5	13.8	18.3	20.2	20.8	22.8
Western Samoa	Apia	.....	.....	66.0	88.0	22.0	31.0

¹Whole country

Source: International Sugar Organization, Sugar Year Book, 1976.

SUGAR SUPPLY AND DISTRIBUTION BY COUNTRIES, 1976

Note: Data for 1977 not available at time of printing.

(SHORT TONS—RAW VALUE)

Countries	SUPPLY		DISTRIBUTION	
	Production	Imports	Consumption	Exports
<u>NORTH AMERICA:</u>				
Canada	172,301	1,037,020	1,062,688	59,035
U.S.A.	7,096,958	4,660,186	11,022,727	75,801
U.S.A. (Mainland)	(5,741,324)	(4,660,186)	(10,850,066)	(75,801)
Hawaii	(1,052,112)	(0)	(0)	(0)
Puerto Rico & Virgin Isl.	(303,522)	(0)	(0)	(0)
TOTAL	7,269,259	5,697,206	12,085,415	134,836
<u>EUROPE:</u>				
Albania	23,148 ¹	14,516 ⁴	38,581 ¹	0
Austria	469,248	0	387,840	139,616
Bulgaria	253,529 ¹	363,759 ⁶	617,288 ¹	0
Cyprus	0	14,086	13,779 ¹	0
Czechoslovakia	683,426	119,658	694,449	78,810
E.E.C.	11,880,754	2,294,823	11,850,499	2,059,890
Finland	85,098	155,364	215,610	32,842
French Overseas Terr. ⁷	0	24,251 ⁶	23,148 ¹	224 ⁵
German Dem. Republic	671,190	208,709	782,743	74,383
Gibraltar	0	991 ⁴	992 ¹	0
Greece	425,437	292	305,541	37,148
Hungary	435,358	166,231	497,051	2,202 ²
Iceland	0	11,800	11,023	0
Malta	0	28,325 ⁴	24,251 ¹	0
Norway	0	185,638	183,041	0
Poland	1,955,520	18,035	1,784,448	387,905
Portugal: Mainland	0	321,118	280,573	44,469
Azores & Madeira	12,863	8,229	20,954	0
Roumania	618,390	132,056	716,495	0
Spain: Penin. & Bal.	1,281,343	138,749 ⁴	1,187,460	0
Canary Isl.	0	38,860 ¹	38,581 ¹	0
Sweden	331,812	146,678	419,249	43
Switzerland	91,792	249,581	303,497 ²	182
Turkey	1,201,805 ²	0	1,125,004	4,493
U.S.S.R.	9,369,550 ¹	4,144,329	13,227,600 ¹	87,429
Yugoslavia	639,815	348,778 ³	673,256	76 ³
TOTAL	30,430,007	9,134,856	35,422,953	2,949,712
<u>CENTRAL AMERICA:</u>				
Bahamas	0	8,770 ⁴	8,377 ¹	0
Barbados	117,380	0	16,340	102,771
Belize	75,223	0	6,234	64,257
Bermuda	0	2,756 ⁶	2,756 ¹	0
Costa Rica	220,460	0	125,662	65,075
Cuba	6,780,024	0	586,334	6,353,274
Dominican Republic	1,418,600	0	184,018	1,101,037
El Salvador	287,809	0	135,490	143,122
Guatemala	570,233	0	225,018	354,362
Haiti	66,138 ¹	138 ⁴	60,627 ¹	6,218 ⁵
Honduras	89,080	24	81,822	8,023
Jamaica	405,545	0	114,782	275,446 ⁶
Leeward and Windward Isl.	40,190	12,413 ⁴	15,983	36,564
Mexico	2,987,110	0	2,949,106	550 ⁵
Netherlands Antilles	0	8,377 ⁶	8,377 ¹	0
Nicaragua	266,757 ¹	0	110,230 ¹	168,966
Panama	177,337	0	53,682	102,416
Panama Canal Zone	0	2,866 ¹	2,866 ¹	0
Trinidad & Tobago	225,983	190	52,993	174,206
Virgin Isl. (U.K.)	0	551 ¹	551 ¹	0
TOTAL	13,727,869	36,085	4,741,248	8,956,287

SUGAR SUPPLY AND DISTRIBUTION BY COUNTRIES, 1976 (cont.)

(SHORT TONS—RAW VALUE)

Note: Data for 1977 not available at time of printing

Countries	SUPPLY		DISTRIBUTION	
	Production	Imports	Consumption	Exports
SOUTH AMERICA:				
Argentina	1,709,577	0	1,127,249 ²	319,801
Bolivia	311,009	0	155,070	161,757
Brazil	7,976,513	0	5,611,816	1,380,508
Chile	264,552 ⁶	90,680 ⁴	363,759 ¹	0
Colombia	1,030,245	0	930,613	110,473
Ecuador	340,610 ¹	0	270,064 ¹	29,599 ⁵
Guyana	377,835	0	40,426	337,407
Paraguay	68,343 ¹	0	55,115 ¹	10,187 ⁵
Peru	1,024,754	0	633,052	313,053
Surinam	11,023 ¹	2,271 ⁴	12,676 ¹	331 ⁵
Uruguay	132,276 ¹	67 ⁴	126,765 ¹	5,228 ⁵
Venezuela	562,173 ¹	107,840 ⁴	595,242 ¹	0
TOTAL	13,808,911	200,858	9,921,846	2,668,345
ASIA:				
Afghanistan	11,023 ¹	66,138 ⁶	71,650 ¹	0
Bangladesh	120,960	0	113,537	0
Brunei	0	4,960 ⁶	4,960 ¹	0
Burma	88,184 ¹	6 ⁴	88,184 ¹	0
China	4,409,200	691,346	5,070,580	26,476
(Taiwan Province)	859,794 ¹	0	330,690 ¹	470,524 ⁴
Democratic Kampuchea	0	11,574 ¹	11,023 ¹	0
Hong Kong	0	121,253 ⁶	104,719 ¹	11,522
India	5,548,316	0	4,426,933	1,008,502
Indonesia ³	1,521,174	192,903	1,528,890	0
Iran	716,495 ¹	207,253 ⁴	1,047,185 ¹	0
Iraq	11,682	400,773	426,328	0
Israel	43,612	172,211	207,640	0
Japan	557,228	2,769,667	3,507,506	8,530
Jordan	0	123,384	52,910 ¹	0
Korea, Dem. People's Rep.	0	143,299 ¹	143,299	0
Korea, Republic of	0	345,170	259,280	89,314
Kuwait	0	44,450 ⁴	40,785 ¹	0
Lao People's Dem. Rep.	0	4,409 ¹	4,409 ¹	0
Lebanon	11,023 ¹	39,214 ⁴	55,115 ¹	0
Macao ³	0	2,756 ¹	2,756 ¹	0
Malaysia	55,115 ¹	399,607 ⁴	418,874 ¹	3,097 ⁵
Maldives	0	4,299 ⁶	4,079 ¹	0
Mongolia	0	23,121 ⁴	24,251 ¹	0
Nepal	11,464	5,176 ⁴	17,339	331
Pakistan	746,102	0	718,313	0
Persian Gulf	0	54,423 ⁴	60,627 ¹	1 ⁵
Philippines	3,289,243	0	926,751	1,669,514
Saudi Arabia	0	121,852 ⁴	121,253 ¹	0
Singapore	0	120,437	99,544	24,986
Socialist Rep. of Vietnam	0	242,506 ⁶	264,552 ¹	4,612 ⁵
Sri Lanka	25,927	51,578	79,042	0
Syrian Arab Republic	29,208	189,000	224,170	0
Thailand	1,936,890	0	627,018	1,262,450
Timor ³	0	882 ¹	882 ¹	0
Yemen	0	116,231 ⁴	55,115 ¹	0
Yemen Democratic	0	42,112 ⁴	41,887 ¹	0
TOTAL	19,992,641	6,711,984	21,182,075	4,579,859

SUGAR SUPPLY AND DISTRIBUTION BY COUNTRIES, 1976 (cont.)

(SHORT TONS—RAW VALUE)

Note: Data for 1977 not available at time of printing

Countries	SUPPLY		DISTRIBUTION	
	Production	Imports	Consumption	Exports
OCEANIA:				
Australia	3,742,375	0	861,202	2,889,115
British Oceania	0	4,189 ¹	4,189 ¹	0
Fiji	338,121	55	33,084	282,934
New Zealand	0	187,281	186,840	459
Papua, New Guinea	0	22,424 ⁴	22,046 ¹	0
U.S. Oceania	0	6,063 ¹	6,063 ¹	0
Western Samoa	0	3,396	3,297	0
TOTAL	4,080,496	223,408	1,116,721	3,172,509
AFRICA:				
Algeria	22,046 ¹	421,299 ⁴	396,828 ¹	0
Angola ³	55,115 ¹	45,911 ⁴	88,184 ¹	0
Benin	0	9,921 ⁶	9,921 ¹	0
Botswana	0	12,125 ¹	11,574 ¹	0
Burundi	0	1,440	3,108	0
Cameroon, United Republic of	35,274 ¹	19,568 ⁴	38,581 ¹	0
Cape Verde Islands ³	0	6,552 ⁴	5,512 ¹	0
Central African Republic	0	4,079 ⁶	4,079 ¹	0
Chad	0	30,864 ⁶	30,864 ¹	0
Congo	37,994	0	11,023 ¹	17,206
Egypt, Arab Republic of	634,925	270,229	889,721 ²	0
Equatorial Guinea	0	882 ¹	882 ¹	0
Ethiopia	149,922	0	136,802	19,010
Gabon	0	6,532 ⁴	5,512 ¹	0
Gambia	0	7,179 ⁴	6,614 ¹	0
Ghana	13,382	50,096	63,478	0
Guinea	14,330 ¹	1,273 ⁴	15,432 ¹	0
Guinea Bissau ³	0	2,211 ⁴	2,205 ¹	0
Ivory Coast	24,251	15,851	36,494	0
Kenya	200,189	42,700 ⁴	220,460 ¹	0
Liberia	0	9,754 ⁴	8,818 ¹	0
Libyan Arab Jamahiriya	0	126,315	126,033	0
Madagascar	125,707	0	94,401	34,941
Malawi	96,161	0	40,948	44,474
Mali	5,512	27,556	35,274	0
Mauritania	0	23,957 ⁴	22,046 ¹	0
Mauritius	805,306	26	41,342	643,362
Morocco	275,575 ¹	300,928	551,150 ¹	0
Mozambique ³	242,506 ¹	0	143,299 ¹	162,364 ⁵
Niger	0	12,676 ⁶	12,676 ¹	0
Nigeria	33,069 ¹	294,149 ⁴	220,460 ¹	0
Rwanda	551 ¹	2,756 ¹	3,307 ¹	0
St. Helena	0	243 ¹	243 ¹	0
St. Thome and Principe ³	0	1,047 ¹	1,047 ¹	0
Senegal	0	85,083	88,184 ¹	0
Seychelles	0	1,608 ⁴	1,653 ¹	0
Sierra Leone	0	28,109 ¹	28,109 ¹	0
Somalia	44,092 ¹	25,113 ⁴	66,138 ¹	0
South Africa	2,329,675	56,573	1,438,162	947,818
Southern Rhodesia	242,506 ¹	0	143,299 ¹	99,207 ¹
Spanish Poss. in N. Africa	0	8,047	8,047 ¹	0
Sudan	154,322 ¹	158,070 ⁴	314,156 ¹	0
Swaziland	249,465	0	21,341	230,446
Tazania, United Rep. of ³	121,678	13,154 ⁴	104,610	26,560

SUGAR SUPPLY AND DISTRIBUTION BY COUNTRIES, 1976 (cont.)
(SHORT TONS—RAW VALUE)

Note: Data for 1977 not available at time of printing

Countries	SUPPLY		DISTRIBUTION	
	Production	Imports	Consumption	Exports
<u>AFRICA: continued</u>				
Togo	0	6,252 ⁴	6,063 ¹	0
Tunisia	5,512 ¹	220,895 ⁴	165,345 ¹	0
Uganda	21,509	0	15,594	5,875
Upper Volta	0	10,472 ⁶	10,472 ¹	0
Zaire	71,650 ¹	22,464 ⁴	93,696 ¹	20 ⁵
Zambia	88,605	0	90,274	0
TOTAL	<u>6,100,829</u>	<u>2,383,960</u>	<u>5,873,461</u>	<u>2,231,263</u>
WORLD TOTAL	95,410,012	24,365,233	90,343,719	24,692,811

¹Estimated.

²Calculated.

³Tel Quel.

⁴As reported by countries of origin.

⁵As reported by countries of destination.

⁶Partly estimated.

⁷Comores, F. Terri. of Afars & Issas, French Oceania, New Caledonia, New Hebrides and St. Pierre & Miquelon.

Source: ISO (London) Statistical Bulletin Vol. 36, No. 11, Nov. 1977.

Part V

MISCELLANEOUS

GLOSSARY

BAGASSE: Fibrous residue remaining after sugarcane has been milled to extract the sugar-containing juices.

BLACKSTRAP MOLASSES: The final product remaining after all the commercially recoverable sucrose has been removed from the juices expressed from cane. It is a dark colored, heavy, viscous liquid.

BRIX: The measure of density of a solution containing sucrose as determined by a hydrometer.

CALORIE: Unit expressing the energy-producing value of food. A pound of sugar contains 1,790 calories. A standard teaspoon contains 18.

DEXTROSE: A widely occurring crystallizable, simple sugar which contains 6 carbon atoms in contrast to the 12 found in sucrose. It is obtained in commercial quantities by the action of acid on cornstarch. It is less sweet than sucrose.

FRUCTOSE: An alternate chemical name for levulose.

GLUCOSE: (1) An alternate chemical name for dextrose. (2) A name given to corn syrups which are obtained by the action of acids and/or enzymes on cornstarch. Commercial corn syrups are nearly colorless and very viscous. They consist principally of dextrose and another sugar, maltose, combined with gummy organic materials known as dextrans, in water solution.

GUR: Cane juice, concentrated nearly to dryness by boiling over an open fire, without centrifuging and with no purification than by skimming. This ancient process is still used for producing a large share of the sugar consumed in India and some other countries. The crude product is high in glucose and correspondingly low in sucrose.

HIGH FRUCTOSE CORN SYRUP: High fructose corn syrups (HFCS) are produced by the enzymatic conversion of a portion of the glucose in corn syrup to fructose.

Composition of presently available products ranges from 7 to 55% glucose and 42 to 90% fructose on dry solids, the balance being other saccharides. Dry solids average about 71% on total weight. The product is roughly comparable to invert syrup made from sucrose in terms of sweetness and physical properties.

HIGH TEST MOLASSES: A concentrated, clarified cane juice which has been inverted (usually about $\frac{2}{3}$) to prevent sucrose from crystallizing at the high concentrations normally employed.

INVERT OR INVERT SUGAR: The mixture of equal parts of dextrose and levulose produced by the action of acid or enzymes on solutions of sucrose.

LEVULOSE: A highly soluble, simple sugar, also containing 6 carbon atoms, it is crystallized with great difficulty, is generally considered sweeter than sucrose, and is used in considerable quantities in combination with dextrose and sucrose in invert sugars.

LIQUID SUGAR: A concentrated solution of refined sucrose or of a mixture of sucrose and invert sugar.

MASSECUITE: A dense mass of sugar crystals mixed with mother liquor, obtained by evaporation.

MOLASSES: The mother liquor separated from sugar crystals in massecuite.

NON-CENTRIFUGAL SUGARS: Crude sugars made from the sugarcane juice by evaporation and draining off the molasses. Among local names are "muscovado," "panocha," and "papelon."

PLANT CROP: The sugarcane crop started with seed pieces (setts).

POLARIZATION: The value (designated as "pol") determined by direct or single polarization of a normal weight solution in a saccharimeter or polariscope. (Based on Spencer and Meade.)

RATOON: Second and subsequent crops grown from the root systems of previous plantings of sugarcane. Usually one or more ratoon crops are harvested before the fields are plowed and replanted.

RAW SUGAR: The impure centrifugal sugar of commerce, a light brown crystalline material, generally containing between 96 and 99% sucrose, plus various impurities and moisture. Other names are "panocha" and "demarara."

SOFT SUGARS: Highly refined, dark-colored, molasses-flavored sugars which are frequently called brown sugars. They contain significant amounts of non-sucrose.

SUCROSE: A sweet crystallizable, colorless sugar which constitutes the principal sugar of commerce. Refined cane and beet sugars are essentially 100% sucrose. Under certain conditions sucrose breaks down to dextrose and levulose.

SYRUP: Concentrated clarified cane juice before crystallization.

TEL QUEL: Literally, such as (it is). When used describing sugar it means "as made," hence of a polarization usually varying among mills and producing areas.

TURBINADO: Direct consumption raw sugar of high polarization which must be dried in a granulator to a very low moisture content.

